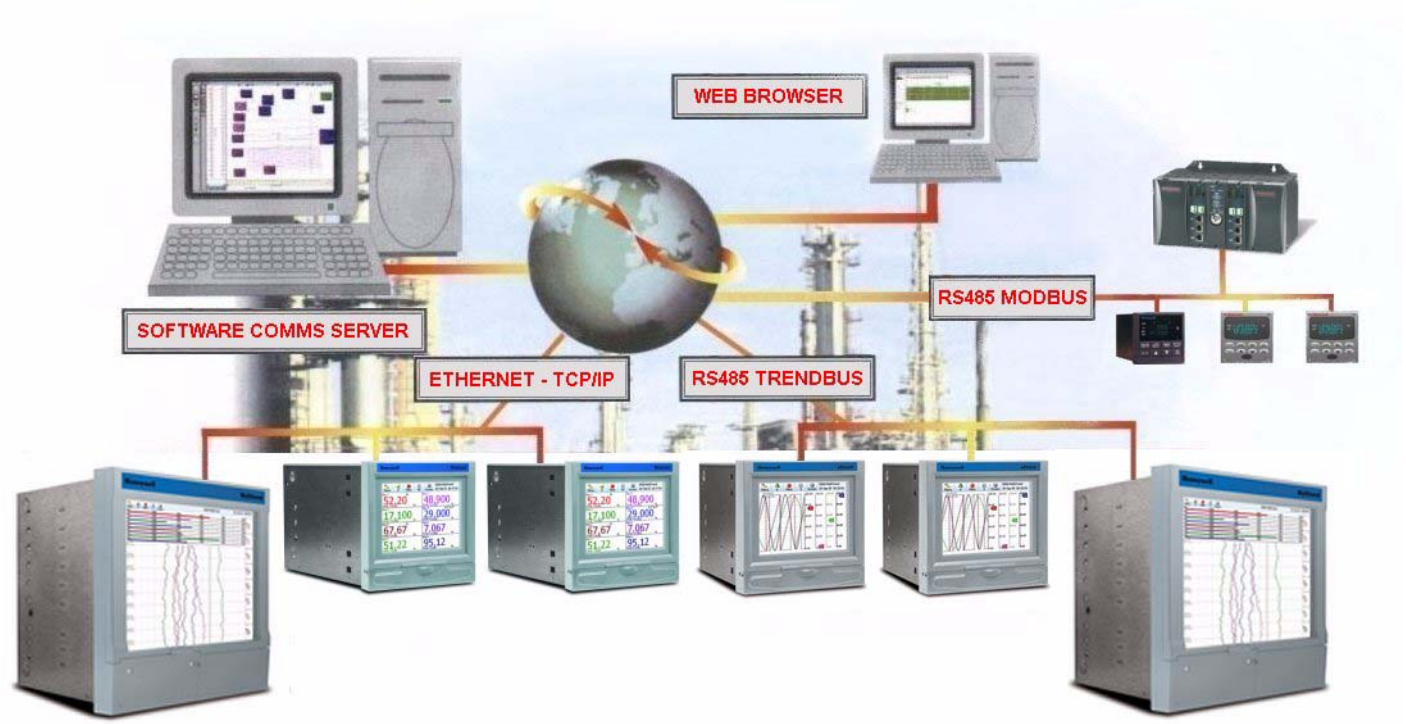
Trend Analysis Software User Manual

100mm/180mm, X Series and GR Recorders



Network aware Data Configuration and Analysis Tool with Database Management and Communications Server

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Chapter 1: Welcome to the Trend Anaysis Software

Features

Features	Trend Viewer	Trend Manager	Trend Server
Full Configuration of ***100mm, 180mm &*** **X Series** Recorders		✓	✓
Import data from removable media	✓	✓	✓
Print all graph data and recorder configurations	✓ (graph data only)	✓	✓
Operates in Windows 8 (32 and 64 bit-Professional, Enterprise and Ultimate Edition), Windows Server 2012, Windows 7 (32 and 64 bit - Professional, Enterprise and Ultimate Edition), Windows Server 2008***. Windows™ Vista, Windows XP, Windows Server 2003.	✓	✓	✓
Password protection - Full user traceability			✓
Archive data on integral secure database		✓	✓
Concurrent Batch Mode		✓	✓
Export using CSV format files		✓	✓
Enable Fuzzy Logging		✓	✓
Events system including user counters and reports		✓	✓
Export using OPC links			✓
Communicate with recorders using RS485 interface *			✓
Communicate with recorders using Ethernet TCP/IP			✓
Distribute all recorder data over LAN plant-wide			✓
FTP or secure Communication Interface over Ethernet			✓
Web browse a recorder			✓
Send setup to recorder via Ethernet			✓
Audit trail manager			✓
Relating data retrieval used for graphing & logging			✓
Replay of historical and Realtime data using a split screen format.			✓
Ethernet/RS485 communications*			✓
Enable Modbus and Modbus X via Ethernet or RS485*			✓
Comms Server manages the communication status of the recorder			✓

Features	Trend Viewer	Trend Manager	Trend Server
Remote access to other servers via Ethernet			✓
Modbus Master and Communication with Slave over RS485 or Ethernet			✓
IQOQ Protocol Documentation			✓
AMS2750 survey setup		✓	✓
View Archived Databases			✓

* RS485 is available as an option on the ***100mm key recorder***, this is the recorder with a four way directional key on the keypad

** not featured on the **X Series** and **GR Series** Recorders

******* Secure Communication Interface is supported by Windows 7 or higher .

Chapter 2: Introduction to the Trend Analysis Software

Introduction

The ***Trend Manager*** software is a Windows™ based PC package which accompanies the ***100mm, 180mm &* X Series** Recorders as a data acquisition and configuration tool. The mouse and keyboard operations are Windows™ orientated and this manual is written under the assumption that the user is familiar with Windows™.

Trend Manager is designed and written for Windows Vista, Windows XP*, Win2K3*, Windows 7 (32 and 64 bit - Professional, Enterprise and Ultimate Edition), Windows 8 (32 and 64 bit-Professional, Enterprise and Ultimate Edition),Windows Server 2008 and Windows Server 2012. ***Note:** Secure Communication Interface is supported by Windows 7 or higher.

Any technical terms peculiar to the range of recorders should be referred to in the*"Glossary" on page 251*.

Software Options

Trend Manager software is available listed below. The attributes of each level are listed in *"Features" on page 1.*

Trend Viewer

This software is available free of charge and allows the user to view, graph and print data from a Floppy disk or PCMCIA memory card interface on the ***100mm and 180mm*** recorders and from Compact Flash and USB key on the **X Series** recorders, and from SD Card and USB key on the **GR Serie**s recorders.

Trend Manager

A stand alone package which allows the user to fully configure recorders, as well as archive, graph, print and export data. Total recorder control and simulation within an integrated secure data base.

Trend Server

A fully network aware package which allows data viewing, archiving and communication with other recorders. The number of recorders that can be networked for communications is limited by the specification of the PC that is acquiring the data and the capabilities of the network itself.

All software in the ***Trend Manager*** has a comprehensive on-line help system with context-sensitive help built in. Just hit the F1 key to call up the specific help file relevant to where you are in the software application.

Database Management Tool

Data archive tools are included as standard as well as the ability to E-mail, graph, print and export data. Database Management Tool software is available as a separate software application that comes with ***Trend Server*** software.

Communication Service

The ***Trend Server*** software has an integral Communications Server that manages the communications status of recorders on a serial port (RS485) or through an Ethernet connection. ***100 or 180mm*** recorders with an RS485 card can use an RS485 to RS232 converter (eg. Westermo: Model No. MA42, Serial No. 4908) for RS232. Recorders are held on databases and the databases are held on servers. By accessing other comms servers remotely it is possible to receive data from other recorders held on databases on other servers - known as remote servers.

The comms server uses IP Addresses to locate recorders on local and remote servers. All logging configuration for comms logging and logging to a database is set up from the Comms Server.

Recorder data can be entered into any PC on the LAN (Local Area Networks) and automatically viewed and graphed at any other PC. ***Trend Server*** offers the ability to download and import data from Ethernet connected remote recorders. **GR Series** recorders.

X Series and **GR Series** Recorders have Modbus and Modbus X capabilities via Ethernet and RS485 comms.

OPC 2.0 DA and A&E server are provided for third party clients to get the real time data and events.

NB. *Only Ethernet communications available as standard on the ***100mm recorder*** with directional key.

IQOQ Protocol Document

Custom built IQOQ reports can be gererated based on the configuration of the recorder. The configuration can be validated as a process of confirming that a piece of equipment or process meets the stated requirements to produce a regulated product. *See “Appendix H - IQOQ Protocol Document” on page 305.*

AMS2750 Capabilities

Specific funtionality has been aded to the software to allow configuration of Process mode and TUS mode in line with AMS2750 specifications. AMS2750 is the specification that covers pyrometric requirements for thermal processing equipment used for heat treatment.

Trendview Historian Software

Trendview Historian function uses OPC HDA to acquire the data, refer to 43-TV-25-41, Trendview Historian User Guide. A Windows-based Client application is be used to view and access historical data from Trendview OPC Historian Server.

Trendview Batch Report Tool

A tool that improves on the creation of specific Batch reports from TrendManager or TrendServer database makes it easier to analyze and document specific batch process. This tool uses the recorder batch information that has been imported into the TrendManager software, eliminating the error prone steps of manually entering the data into a spreadsheet application. This tool allows a user to easily generate separate batch report in a secure PDF format to document the final results of the batch process.

100 or 180mm

100 or 180mm recorders require a separate comms card fitted with an Ethernet and the FTP option installed. Many communication protocols are now available including: RS485 Trendbus (including web browser), Ethernet (using FTP), RS232 (web browser). Plus RS485 Modbus and Profibus options on the recorder. For a standard barcode reader that provides an ASCII output use the standard Ethernet/RS232/RS485 comms card.

On ***100mm thumb*** recorder and ***180mm recorder***, an optional communication card is available featuring RS-485 trendbus in addition to ethernet. Another optional communication card features RS-485 Modbus and Modbus-X communications.

Chapter 3: Installation

Installation

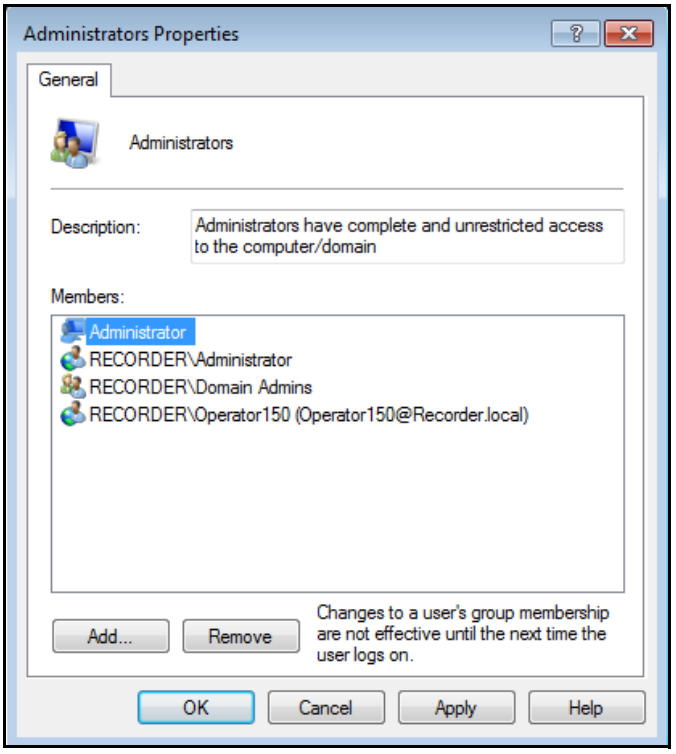
Installation *Trend Analysis Software* :

Prerequisites:

- Close all the Windows applications before starting ***Trend Analysis Software***.
- It is not recommended to load multiple installation programs on the same PC.
- You must be a member of Administrators group to install/uninstall ***Trend Analysis Software***.

NOTE: Steps to check the Administrator rights for any user:

1. Please go to the Control Panel -> Administrative Tools -> Computer Management.
2. Select the Local Users and Groups.
3. Go to Groups.
4. Right Click on Administrators group.
5. Select Properties. List of the users will be populated.
6. Add any user for whom Administrative privileges are required (in the below diagram, “RECORDER\Operator150” has been added in the Administrators group)



To Install *Trend Analysis Software*:

- Load the DVD into the drive and wait for the autorun sequence to start. If the auto-run does not commence, follow these instructions Go to My Computer->DVD ROM drive.
- Right Click setup.exe

For Windows Vista, Windows7, Windows 8, Windows Server 2008 and Windows Server 2012-

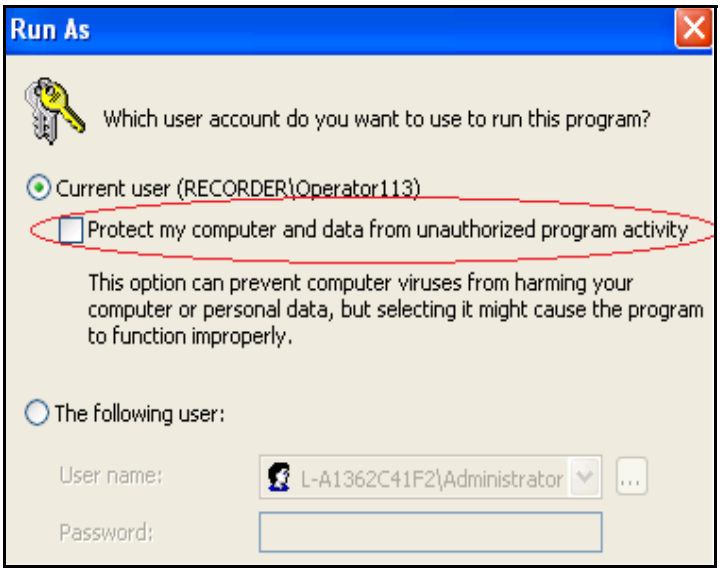
a) Click on “Open” if you are logged on with Administrative privileges.

b) Or click on “Run as Administrator”.

For Windows XP, Windows Server 2003 –

a) Click on “Open” if you are logged on with Administrative privileges.

b) If “Run as...” option is selected, below window appears.

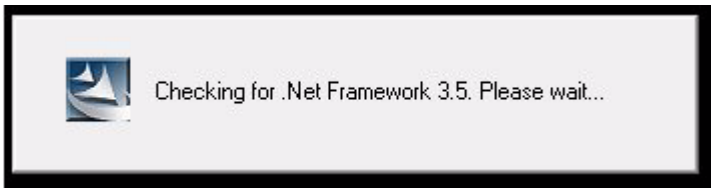

Run As
Which user account do you want to use to run this program?
Current user (RECORDER\Operator113)
Protect my computer and data from unauthorized program activity
This option can prevent computer viruses from harming your computer or personal data, but selecting it might cause the program to function improperly.
The following user:
User name:
L-A1362C41F2\Administrator
Password:

Ensure to uncheck the checkbox “Protect my computer and data from unauthorized program activity” for the “**Current User**” option.

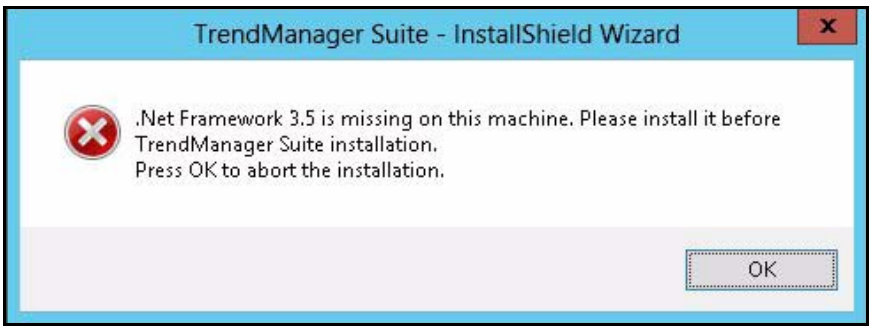
Or provide the Administrative privileges for the “**The following user**” option.

The ***Trend Analysis Software*** **- InstallShield Wizard appears.**

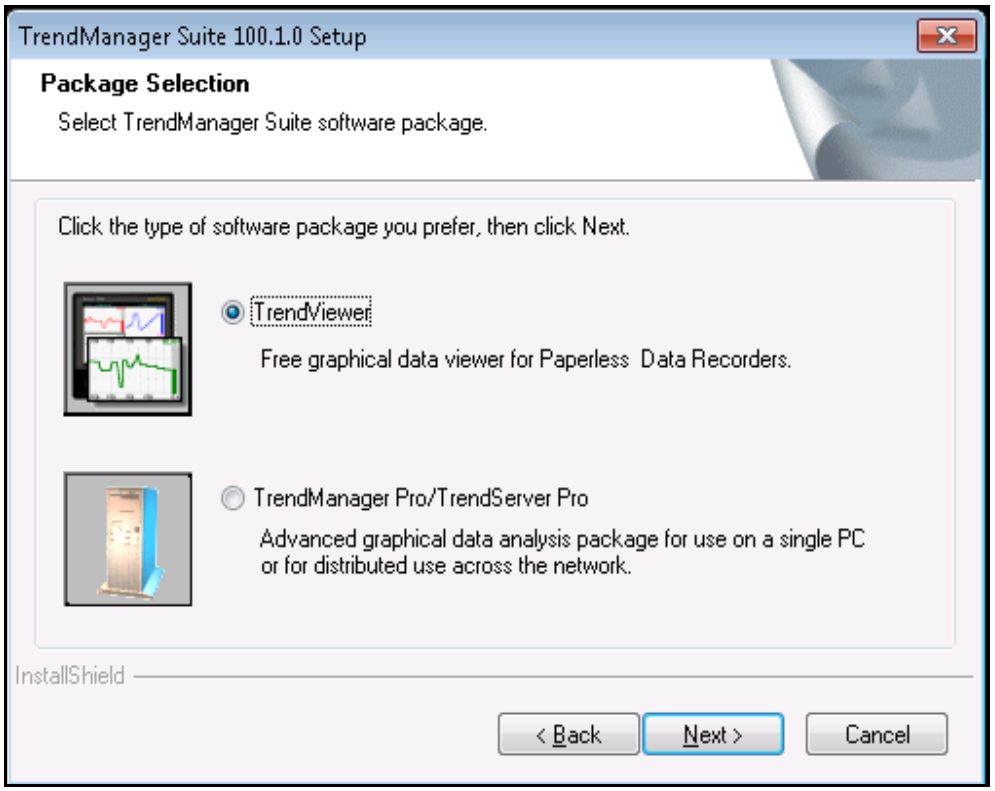
1. It will check for .Net Framework 3.5.



If it is not installed below screen appears and installation will be aborted.


TrendManager Suite - InstallShield Wizard
.Net Framework 3.5 is missing on this machine. Please install it before TrendManager Suite installation.
Press OK to abort the installation.
OK

- Click Next and accept the terms of “License Agreement of ***Trend Analysis Software***” to proceed further.
- Click Next. The Choose Destination Location window appears, displaying information about the default destination folder. If you want to change the default destination folder, click on Browse to specify a different destination folder.
- Click Next. The Language window appears, displaying default “English” language. Other languages supported are German and French. Choose the appropriate language pack.
- Click Next. The Package Selection window appears.


TrendManager Suite 100.1.0 Setup
Package Selection
Select TrendManager Suite software package.
Click the type of software package you prefer, then click Next.
TrendViewer
Free graphical data viewer for Paperless Data Recorders.
TrendManager Pro/TrendServer Pro
Advanced graphical data analysis package for use on a single PC or for distributed use across the network.
InstallShield
< Back
Next >
Cancel

The ***Trend Analysis Software*** has three different versions to install:

1. ***Trend Viewer*** - This software is a free version that is part of the Recorder software.
2. ***Trend Manager*** - This can be purchased and has added features.
3. ***Trend Server*** - This can be purchased and has a complete set of features.

Select the required version, and depending on the version chosen the installation steps will be different.

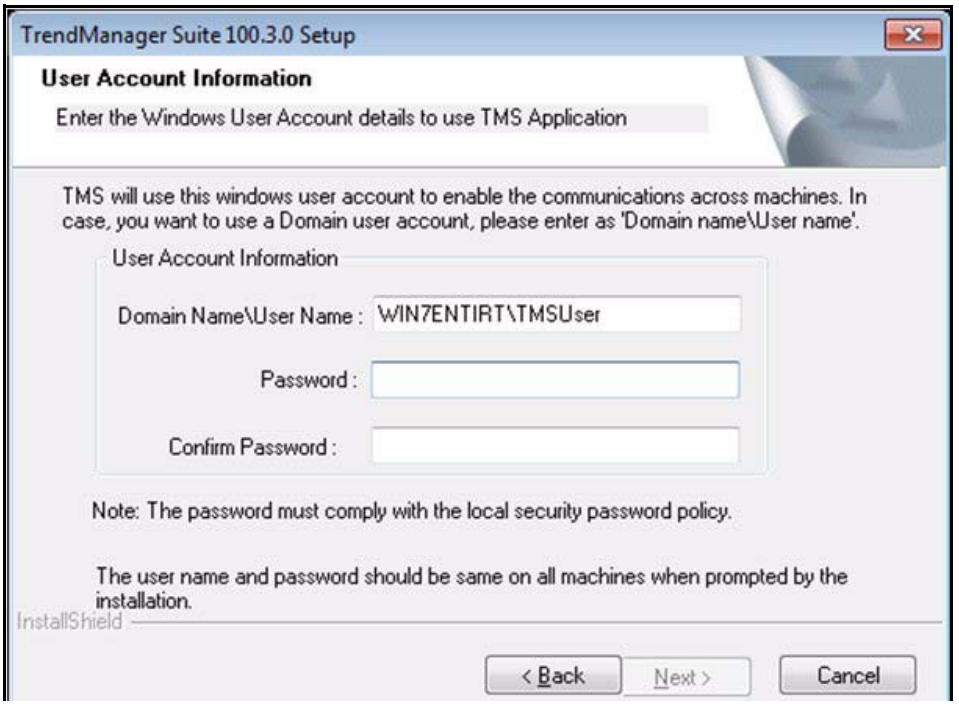
Trend Viewer **Installation:**

- Click Next. The “Start Copying Files” window appears for reviewing the settings before it starts copying the files.
- Click Next. Installation will progress during this process it creates “TMSApplication-AccessGroup”.
  The above groups can be checked only after **completion of installation and restart of machine**, for more details please refer to *“Trend Analysis Software User Groups after Migration” on page 25*.
- The installation complete window appears with a message to restart the machine or not. It is preferred to **restart the machine** before using the application.
- Click Finish.

(License code is not required for ***Trend Viewer*** Installation)

Trend Manager **and** ***Trend Server*** **Installation**

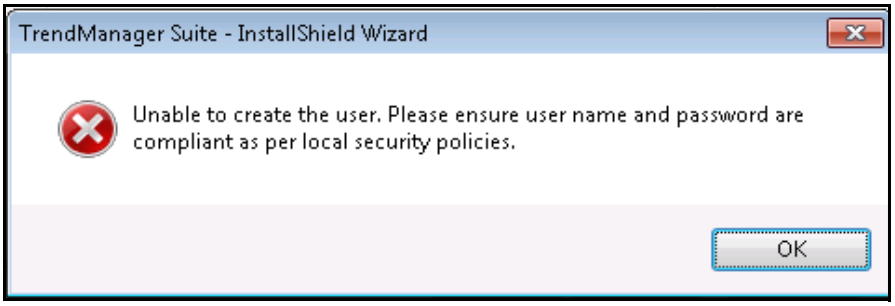
- Click Next. The License window appears, enter the code and organization as supplied with each specific version of software. The code can be found inside the DVD case.
- Click Next. The below User Account Information Window appears and then follow the on-screen instructions.


TrendManager Suite 100.3.0 Setup
User Account Information
Enter the Windows User Account details to use TMS Application
TMS will use this windows user account to enable the communications across machines. In case, you want to use a Domain user account, please enter as 'Domain name\User name'.
User Account Information
Domain Name\User Name :
WIN7ENTIRT\TMSUser
Password :
Confirm Password :
Note: The password must comply with the local security password policy.
The user name and password should be same on all machines when prompted by the installation.
InstallShield
< Back
Next >
Cancel

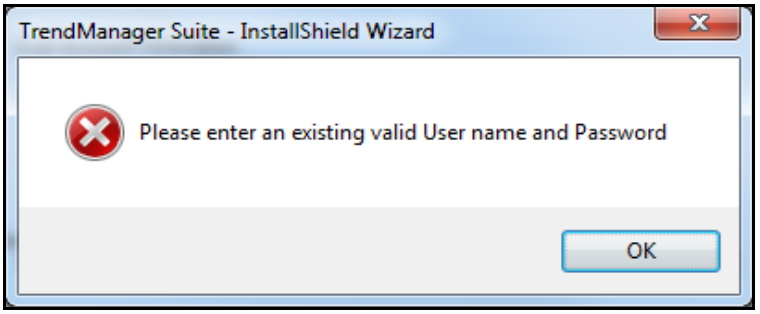
a) The default user account "**TMSUser**" is shown. If the "TMSUser" local user account already exists then provide a password for it, if not enter a new password to create the user account.

b) The default user account can also be changed. You can provide either an existing or new local user account. For new user account, you need to enter a new password.

c) The password must comply with the local security password policy otherwise you will see the below message box :


TrendManager Suite - InstallShield Wizard
Unable to create the user. Please ensure user name and password are compliant as per local security policies.
OK

d) If you have a domain, you can also enter the domain user account and password. If the domain user account is not found then installation will display the below message.



Note (For TrendServer Pro only): The user account entered in the above window is used for setting the **Communications Service (and processes)** to run under it. The password entered will expire as per local security policies after this ***Trend Server*** may stop functioning. Please ensure passwords are updated regularly as per your security policies using Security Configuration Utility which comes along with the installation of ***Trend Analysis Software***. For more details, refer to the "*"Security Configuration Utility" on page 34*".

NOTE (For *Trend Server* only): The user account entered in the above window is used for setting the **Communications Service (and processes)** to run under it. To run **Communications Service** under a different account or on expiry of password, use the Security Configuration Utility which is part of the ***Trend Analysis Software*** installation. For more details, refer to the "*"Security Configuration Utility" on page 34*".

NOTE (For *Trend Manager* only): The user account entered in the above window is used for setting **Database process** to run under it. To run the **Database process** under a different account or on account of expiry of password, use the Security Configuration Utility which is a part of the ***Trend Analysis Software*** installation. For more details, refer to the "*"Security Configuration Utility" on page 34*".

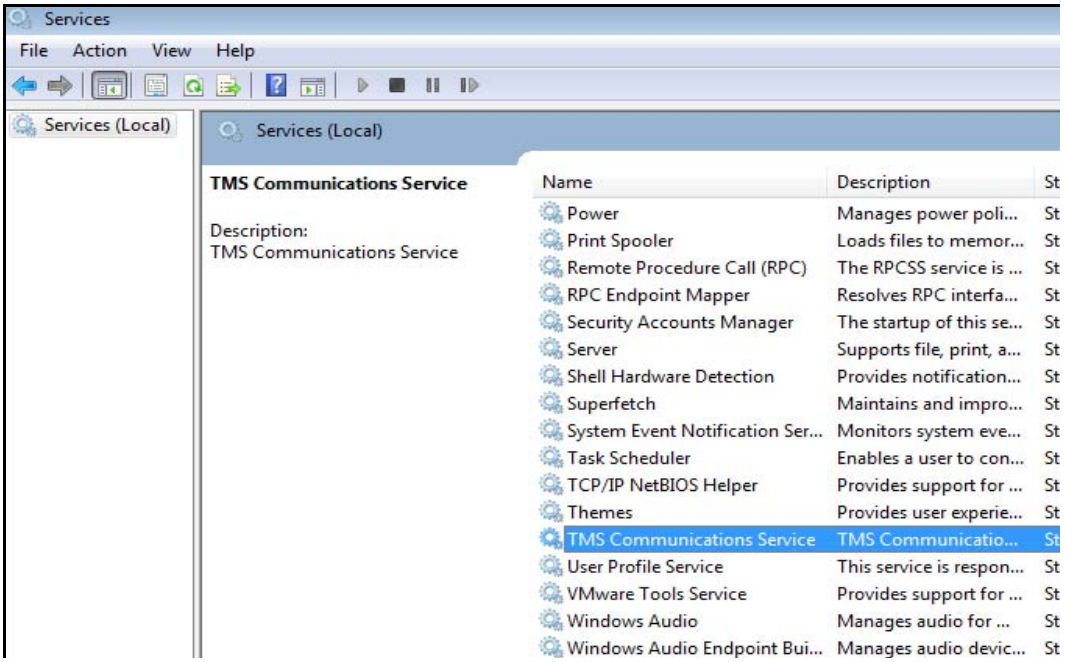
- Click Next. The Start Copying Files window appears for reviewing the settings before starting the copy of files.
- Click Next. Installation will progress. For ***Trend Server*** it creates “TMSApplication-AccessGroup” and “TMServiceAccessGroup” groups and for ***Trend Manager*** it creates only “TMSApplicationAccessGroup”. These groups can be checked only after **completion of installation and restart of machine**, for more details please refer to *“Trend Analysis Software User Groups after Migration” on page 25*.
- The installation complete window appears with message to restart the machine or not. It is mandatory to restart the machine before using the application.
- Click Finish.

Post installation checks for using *Trend Server* :

1. Ensure that **Communications Service** has started.

Steps to check for **Communications Service**:

1. Please go to Control Panel -> Administrative Tools -> Services.
2. You will see below window



In the above window you will see that Communications Service started.

For real time data logging the communication server uses a local machine date and time. Make sure you have set the correct date, time and time zone settings on this machine.

After completing post installation checks, ***Trend Server*** can be configured for data acquisition.

Please refer to “*“Comms Server Logging” on page 195* for “*“Logging Configuration” on page 196* Steps. Please refer to *“Importing via FTP or Secure Communications Interface” on page 156* for “*“Schedule Setup” on page 159*” Steps.

Trend Analysis Software User Groups after Installation

During ***Trend Analysis Software*** installation it creates one common group for all the variants i.e. **TMSApplicationAccessGroup** and for ***Trend Manager*** it creates another group called **TMSServiceAccessGroup.**

NOTE (For ***Trend Server*** only): **TMSServiceAccessGroup** is required for **Communications Service (and processes)** runs under it. Do not delete this user group and also do not modify/delete the user in the user group.

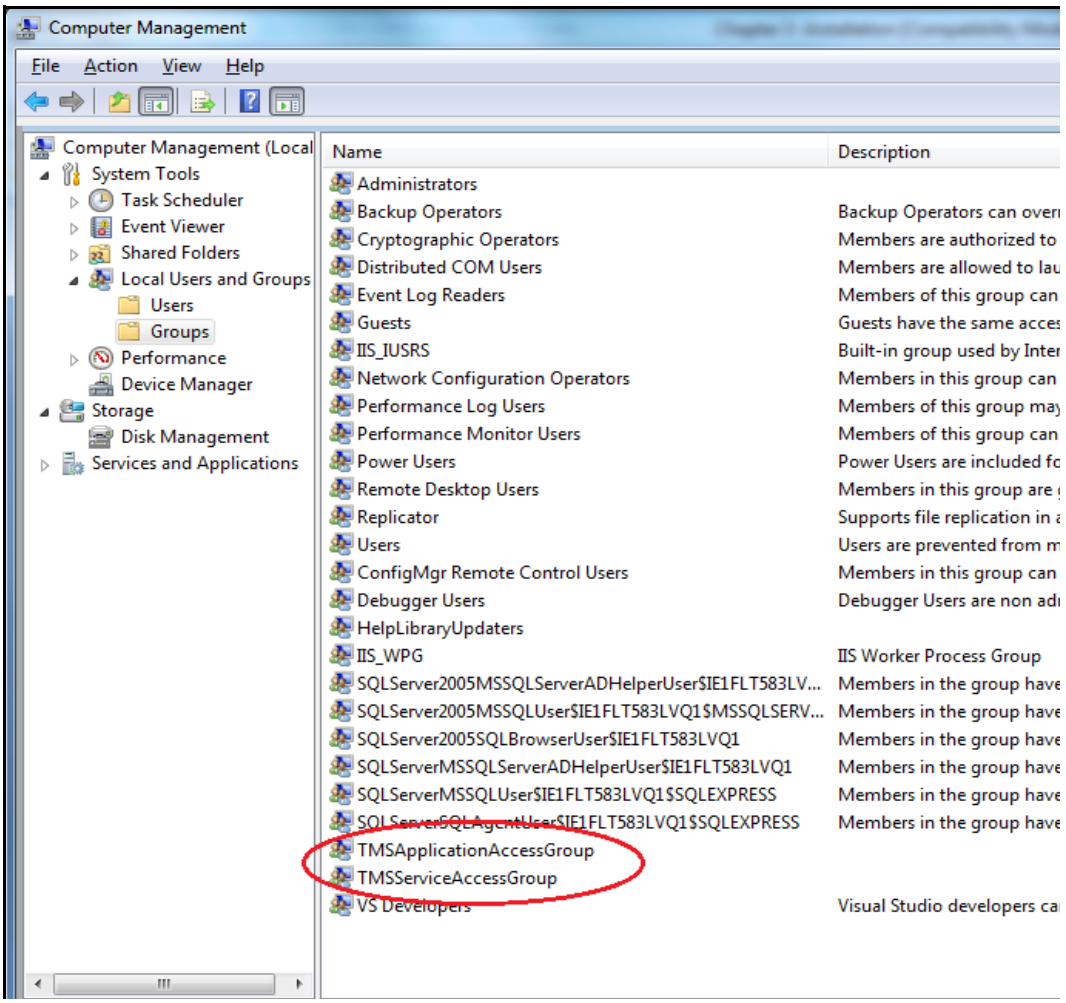
1. The user account provided during installation should be part of **TMSApplicationAccessGroup** for ***Trend Manager*** and will be part of **TMSServiceAccessGroup** in case of ***Trend Server***.
2. Any user who wants to access ***Trend Analysis Software*** application or permissions to enable the communication across computers should be added to the **TMSApplicationAccessGroup**.

Steps to check the group and add user to **TMSApplicationAccessGroup**:

a) Please go to Control Panel -> Administrative Tools -> Computer Management.

b) Select Local Users and Groups.

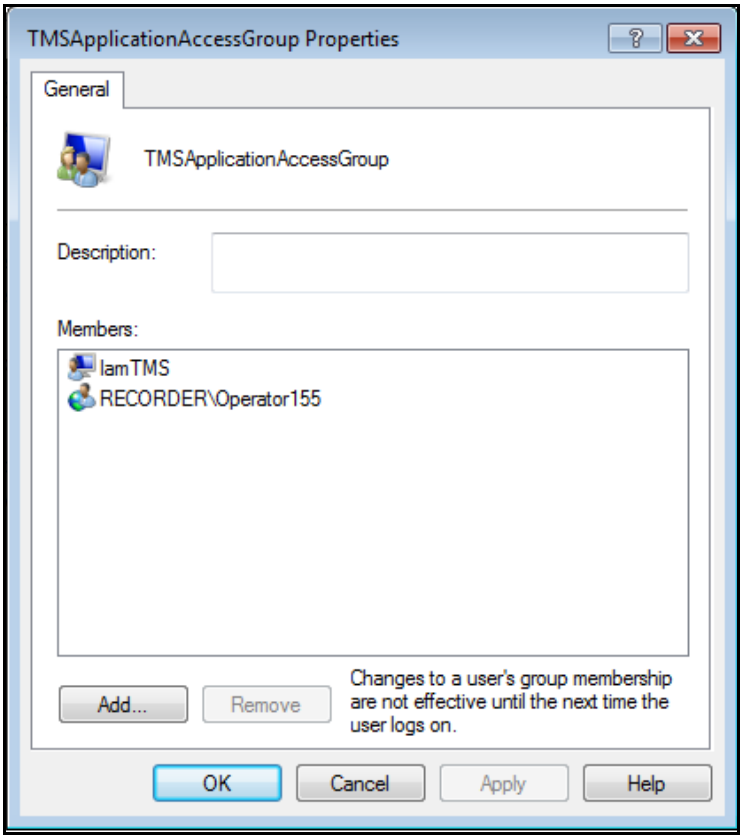
c) Go to Groups. And check for **TMSApplicationAccessGroup.**



d) Right click on **TMSApplicationAccessGroup**.

e) Select Properties. A list of users will be populated who are authorized to access ***Trend Analysis Software*** application.

f) Add any user you want to give authorize to access ***Trend Analysis Software*** application. (In below diagram, “Recorder\Operator155” has been added to **TMSApplicationAccessGroup)**.



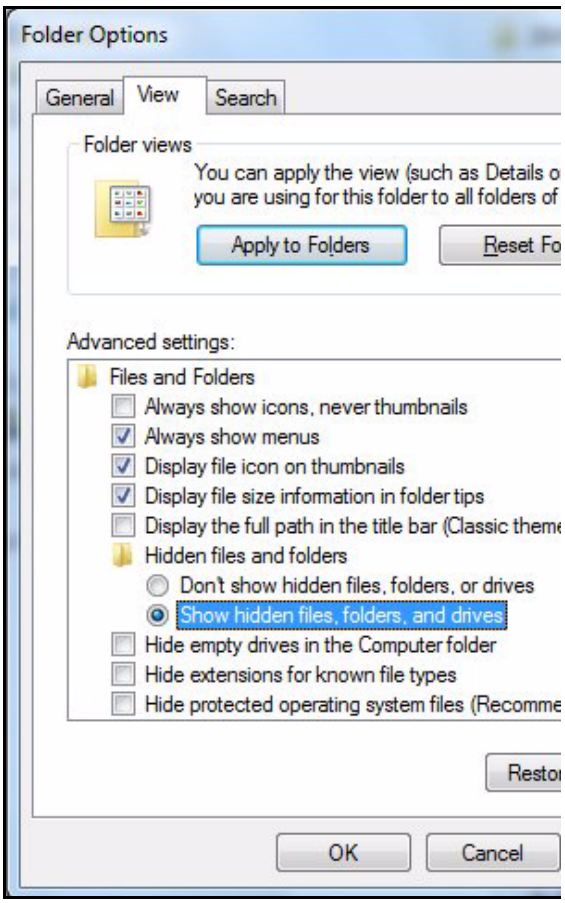
NOTE: Ensure below steps once user is added to “**TMSApplicationAccessGroup**” to access ***Trend Analysis Software*** application:

1. Check for “ ***Trend Analysis Software***”,”TMP” and “CommsServ” folders are present in the virtual store of given user. After locating the given folders in virtual store, take backup and **delete those folders from virtual store**. The virtual store is applicable for Windows Server 2012, Windows Server 2008, Windows 8 and Windows 7.

Steps are given below to locate virtual store folder for the user who is currently logged in the system. By default virtual store folder is hidden.

Steps to show hidden files

- Open explorer
- Go to the Tools -> Folder
- Click on View tab


Folder Options
General
View
Search
Folder views
You can apply the view (such as Details o
you are using for this folder to all folders of
Apply to Folders
Reset Fo
Advanced settings:
Files and Folders
Always show icons, never thumbnails
Always show menus
Display file icon on thumbnails
Display file size information in folder tips
Display the full path in the title bar (Classic theme
Hidden files and folders
Don't show hidden files, folders, or drives
Show hidden files, folders, and drives
Hide empty drives in the Computer folder
Hide extensions for known file types
Hide protected operating system files (Recomme
OK
Cancel

- Check the “Show hidden files, folders, and drives”. Click Ok. please see above image for reference
- Now, go to “C:\Users\<User Name>\ AppData\Local\VirtualStore. Under VirtualStore folder, “\Program Files \TrendManager Suite\TMP5DB”, “\Program Data\TMP” and “\ProgramData\commsserv” will be present. Or in case of 64 bit, this will be “\Program Files (x86) \ ***Trend Analysis Software*** \TMP5DB”.
- After locating them take backup and **delete the folders** “ ***Trend Analysis Software***”, **“TMP” and “Commsserv” from virtual store**.

2. Please logoff and login into the machine to access ***Trend Analysis Software*** application.

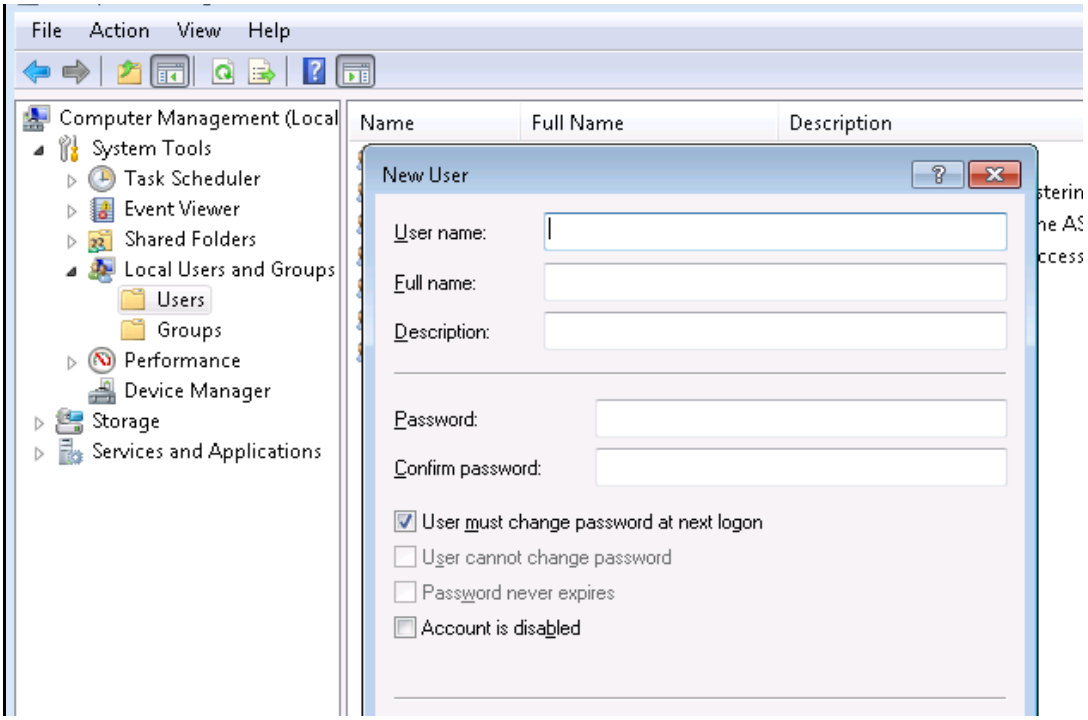
g) Any user trying to use the ***Trend Analysis Software*** Application from remote machine should be part of the “**TMSApplicationAccessGroup**” on the remote system. For ex: If ***Trend Server*** is running under Domain\User1 user on Machine A wants to access communications server of ***Trend Server*** running under Domain\User2 user on Machine B. Then Domain\User1 should be part of **TMSApplicationAccessGroup** of Machine B.
If a local user does not exists on the remote system then a new user with same username and password can be created on the remote system and be added to the **TMSApplicationAccessGroup** of the remote system in order to access communications server of the remote system.

Steps to create a new user:

a) Please go to Control Panel -> Administrative Tools -> Computer Management.

b) Select Local Users and Groups.

c) Right click on Users and Select “New User”. Below “New User” dialog appears.



d) Provide User Name and Password. The new user will get created.

h) The Administrator/Non-Administrator users who are not part of **TMSServiceAccess-Group** or **TMSApplicationAccessGroup** will be able to use the ***Trend Analysis Software*** application if they are already configured with required settings like Windows privileges, folder access permissions and DCOM access permissions similar to the configured settings during ***Trend Analysis Software*** application installation.

i) During uninstallation, the **TMSServiceAccessGroup** and **TMSApplicationAccess-Group** are not deleted.

Migration

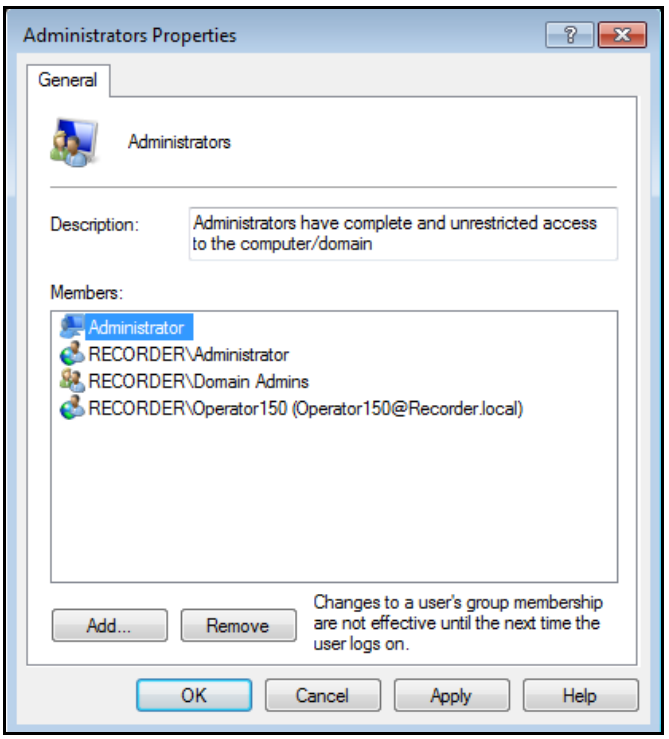
Migration of *Trend Analysis Software* :

Prerequisites:

- Close all the Windows applications before starting ***Trend Analysis Software***.
- It is not recommended to load multiple installation programs on the same PC.
- You must be a member of Administrators group to install/uninstall ***Trend Analysis Software***.

NOTE: Steps to check the Administrator rights for any user:

1. Please go to the Control Panel -> Administrative Tools -> Computer Management.
2. Select the Local Users and Groups.
3. Go to Groups.
4. Right Click on Administrators group.
5. Select Properties. List of the users will be populated.
6. Add any user for whom Administrative privileges are required (in the below diagram, "RECORDER\Operator150" has been added in the Administrators group)



For Windows Vista, Windows 7, Windows 8, Windows Server 2008 and Windows Server 2012-

1. Please take the backup of the below folder.

C:\Program Files\TrendManager Suite\TMP5DB or *C:\Program Files (x86)\TrendManager Suite\TMP5DB.*

2. Please take a backup of the folders below:

C:\ ProgramData\TMP and C:\ProgramData\CommsServ.

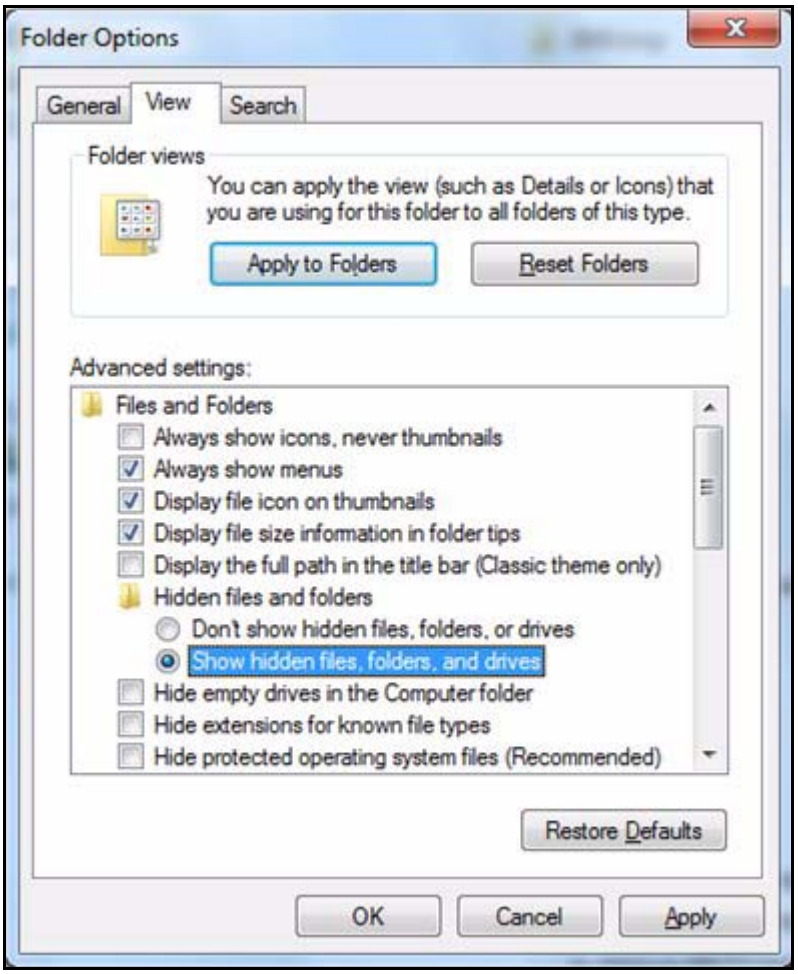
3. Due to the virtualization concept for Windows Vista, Windows 7 , Windows 8, Windows Server 2008 and Windows Server 2012-, it will create a VirtualStore folder for all the users.

Steps are given below to locate the VirtualStore folder for the user who is currently logged in the system:

a) By default VirtualStore folder is hidden.

Steps to show hidden files

- Open Windows Explorer
- Go to the Tools -> Folder
- Click on View tab. Check the “Show hidden files, folders, and drives”. Click Ok. please see below image for reference


Folder Options
General
View
Search
Folder views
You can apply the view (such as Details or Icons) that you are using for this folder to all folders of this type.
Apply to Folders
Reset Folders
Advanced settings:
Files and Folders
Always show icons, never thumbnails
Always show menus
Display file icon on thumbnails
Display file size information in folder tips
Display the full path in the title bar (Classic theme only)
Hidden files and folders
Don't show hidden files, folders, or drives
Show hidden files, folders, and drives
Hide empty drives in the Computer folder
Hide extensions for known file types
Hide protected operating system files (Recommended)
Restore Defaults
OK
Cancel
Apply

b) Now, go to “*C:\Users\<Loggedon Username>\ AppData\Local\VirtualStore*.

Take a backup of the folders listed here, if located under VirtualStore folder, for all users who are:

- ***Trend Analysis Software***at C:\Users\<Loggedon Username>\ App-Data\Local\Virtual- Store \Program Files or C:\Users\<Loggedon Username>\ App-Data\Local\Virtual- Store \ProgramFiles(x86) for 64bit.
- TMP and CommsServ folder at C:\Users\<Loggedon Username>\ App-Data\Local\VirtualStore\ProgramData.

c) Once archived, delete the folders ***Trend Analysis Software***,TMP and CommsServ from the VirtualStore for all the users who want to access ***Trend Analysis Software***.

For Windows XP & Windows Server 2003 –

1. Please take a backup of the folders below :

- *C:\Program Files\TrendManager Suite\TMP5DB* or *C:\Program Files (x86)\TrendManager Suite\TMP5DB for 64bit*.
- *C:\Documents and Settings\All Users\Application Data\TMP* and *C:\ Documents and Settings\All Users\Application Data\CommsServ* folders.

Migration of *Trend Analysis Software*:

- Load the DVD into the drive and wait for the autorun sequence to start. If the autorun does not commence, follow these instructions Go to My Computer->DVD ROM drive.
- Right Click setup.exe

For Windows Vista, Windows 7, Windows 8, Windows Server 2008 and Windows Server 2012-

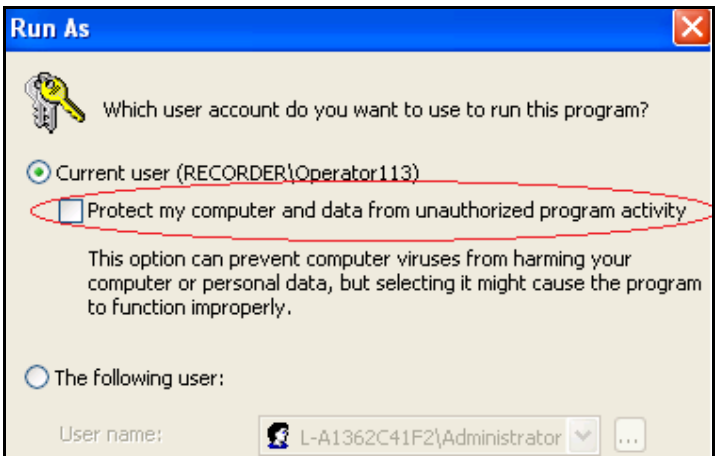
a) Click on “Open” if you are logged on with Administrative privileges.

b) Or click on “Run as Administrator”.

For Windows XP, Windows Server 2003 –

a) Click on “Open” if you are logged on with Administrative privileges.

b) If “Run as...” option is selected, below window appears.

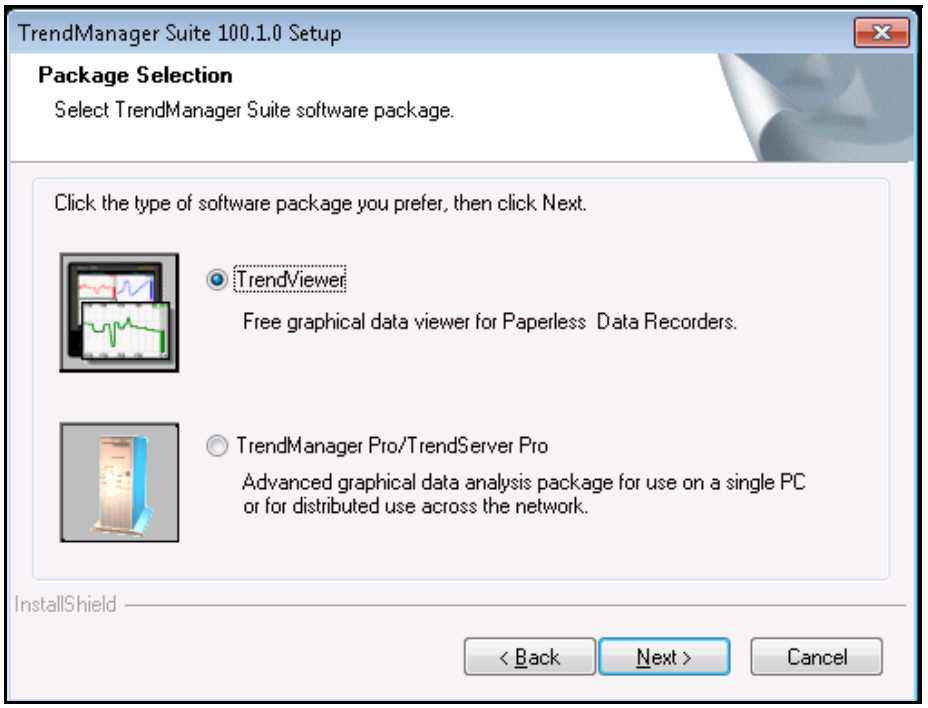

Run As
Which user account do you want to use to run this program?
Current user (RECORDER\Operator113)
Protect my computer and data from unauthorized program activity
This option can prevent computer viruses from harming your computer or personal data, but selecting it might cause the program to function improperly.
The following user:
User name:
L-A1362C41F2\Administrator

Ensure to uncheck the checkbox “Protect my computer and data from unauthorized program activity” for the “**Current User**” option.

Or provide the Administrative privileges for the “**The following user**” option.

The ***Trend Analysis Software*** **- InstallShield Wizard appears.**

- Click Next and accept the terms of “License Agreement of ***Trend Analysis Software***” to proceed further.
- Click Next. The Choose Destination Location window appears, displaying information about the default destination folder. If you want to change the default destination folder, click on Browse to specify a different destination folder.
- Click Next. The Language window appears, displaying default “English” language. Other languages supported are German and French. Choose the appropriate language pack.
- Click Next. The Package Selection window appears.


TrendManager Suite 100.1.0 Setup
Package Selection
Select TrendManager Suite software package.
Click the type of software package you prefer, then click Next.
TrendViewer
Free graphical data viewer for Paperless Data Recorders.
TrendManager Pro/TrendServer Pro
Advanced graphical data analysis package for use on a single PC or for distributed use across the network.
InstallShield
< Back
Next >
Cancel

The ***Trend Analysis Software*** has three different versions to install:

1. ***Trend Viewer*** - This software is a free version that is part of the Recorder software.
2. ***Trend Manager*** - This can be purchased and has added features.
3. ***Trend Server*** - This can be purchased and has a complete set of features.

Select the required version, and depending on the version chosen the installation steps will be different.

Trend Viewer **Migration:**

- Click Next. The “Start Copying Files” window appears for reviewing the settings before it starts copying the files.

- Click Next. Installation will progress during this process it creates “TMSApplication-AccessGroup”.
  The above groups can be checked only after **completion of installation and restart of machine**, for more details please refer to *“Trend Analysis Software User Groups after Migration” on page 25*.
- The installation complete window appears with a message to restart the machine or not. It is preferred to **restart the machine** before using the application.
- Click Finish.

***Trend Manager* and *Trend Server* Migration**

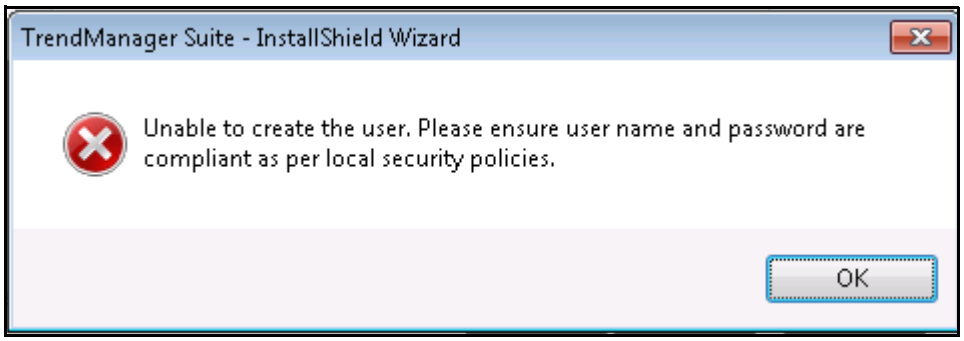
- Click Next. Migration-Prerequisite window appears to follow the prerequisite to take the backup of the folders.
- Click Next. The below User Account Information Window appears and then follow the on-screen instructions.

TrendManager Suite 100.3.0 Setup
User Account Information
Enter the Windows User Account details to use TMS Application
TMS will use this windows user account to enable the communications across machines. In case, you want to use a Domain user account, please enter as 'Domain name\User name'.
User Account Information
Domain Name\User Name :
WIN7ENTIRT\TMSUser
Password :
Confirm Password :
Note: The password must comply with the local security password policy.
The user name and password should be same on all machines when prompted by the installation.
InstallShield
< Back
Next >
Cancel

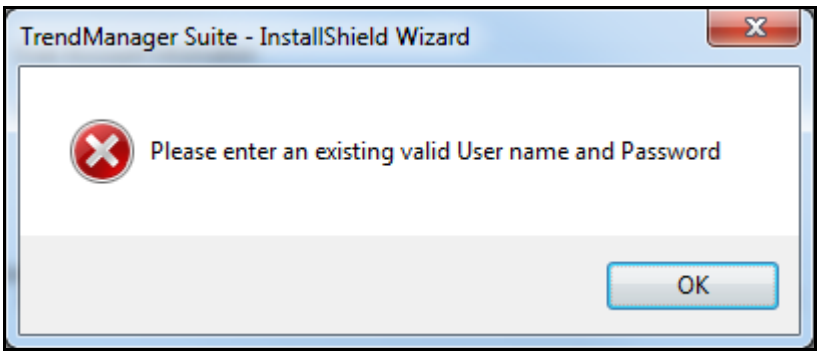
a) The default user account “**TMSUser**” is shown. If the “TMSUser” local user account already exists then provide a password for it, if not enter a new password to create the user account.

b) The default user account can also be changed. You can provide either an existing or new local user account. For new user account, you need to enter a new password.

c) The password must comply with the local security password policy otherwise you will see the below message box :


TrendManager Suite - InstallShield Wizard
Unable to create the user. Please ensure user name and password are compliant as per local security policies.
OK

d) If you have a domain, you can also enter the domain user account and password. If the domain user account is not found then installation will display the below message.



Note (For TrendServer Pro only): The user account entered in the above window is used for setting the **Communications Service (and processes)** to run under it. The password entered will expire as per local security policies after this ***Trend Server*** may stop functioning. Please ensure passwords are updated regularly as per your security policies using Security Configuration Utility which comes along with the installation of ***Trend Analysis Software***. For more details, refer to the "*"Security Configuration Utility" on page 34*".

NOTE (For *Trend Server* only): The user account entered in the above window is used for setting the **Communications Service (and processes)** to run under it. To run **Communications Service** under a different account or on expiry of password, use the Security Configuration Utility which is part of the ***Trend Analysis Software*** installation. For more details, refer to the "*"Security Configuration Utility" on page 34*".

NOTE (For *Trend Manager* only): The user account entered in the above window is used for setting **Database process** to run under it. To run the **Database process** under a different account or on account of expiry of password, use the Security Configuration Utility which is a part of the ***Trend Analysis Software*** installation. For more details, refer to the "*"Security Configuration Utility" on page 34*".

- Click Next. The Start Copying Files window appears for reviewing the settings before starting the copy of files.

- Click Next. Installation will progress. For ***Trend Server*** it creates “TMSApplication-AccessGroup” and “TMServiceAccessGroup” groups and for ***Trend Manager*** it creates only “TMSApplicationAccessGroup”. These groups can be checked only after **completion of installation and restart of machine**, for more details please refer to *“Trend Analysis Software User Groups after Migration” on page 25*.
- Click Next. Migration-Restore data window appears and here backedup files need to be restored by following the below steps before machine restart.

For Windows Vista, Windows 7, Windows 8, Windows Server 2008 and Windows Server 2012:

a) Please copy and paste the TMP and CommsServ folders which were backed up in the Prerequisites to following folder path *C:\ProgramData\TMP* and *C:\ProgramData\CommsServ* location respectively.

b) Please copy the TMP5DB which were backed up in the Prerequisites to following folder path *C:\Program Files\TrendManager suite* or *C:\Program Files (x86)\TrendManager Suite*.

For Windows XP & Windows Server 2003 :

a) Please copy and paste the TMP and CommsServ folders which were backed up in the Prerequisites to following folder path *C:\Documents and Settings\All Users\Application Data\TMP* and C:*Documents and Settings\All Users\Application Data\CommsServ* respectively.

b.) Please copy the TMP5DB which were backed up in the Prerequisites to following folder path *C:\Program Files\TrendManager suite* or *C:\Program Files* (x86)\TrendManager Suite.

It is mandatory to restart the machine before using the application.

- The installation complete window appears with message to restart the machine or not.
- Click Finish.

Post migration checks for using TrendServer Pro:

1. Ensure that Communications Service has started.
2. Launch the ***Trend Server*** and check for configured database servers and realtime comms servers.

And also check for the configured FTP schedulers.

If you are not able to see the above configuration then follow the below steps:

2.1) Shut down Communications Service, please refer “Shutdown Server” for more details.

2.2) To restore the backedup files by following the below steps :

For Windows Vista, Windows 7, Windows 8, Windows Server 2008 and Windows Server 2012:

a) Please copy and paste the TMP and CommsServ folders which were backed up in the Prerequisites to following folder path *C:\ProgramData* location.

b) Please copy and paste TMP5DB which were backed up in the Prerequisites to following folder path *C:\Program Files\TrendManager suite* or *C:\Program Files (x86)\TrendManager Suite*.

For Windows XP & Windows Server 2003 :

a) Please copy and paste the TMP and CommsServ folders which were backed up in the Prerequisites to following folder path *C:\Documents and Settings\All Users\Application Data\TMP* and *C:\Documents and Settings\All Users\Application Data\CommsServ* respectively.

b) Please copy and paste the TMP5DB which were backed up in the Prerequisites to following folder path *C:\Program Files\TrendManager suite* or *C:\Program Files (x86)\TrendManager Suite*.

2.3) Start the Communications Service by opening Comms UI.

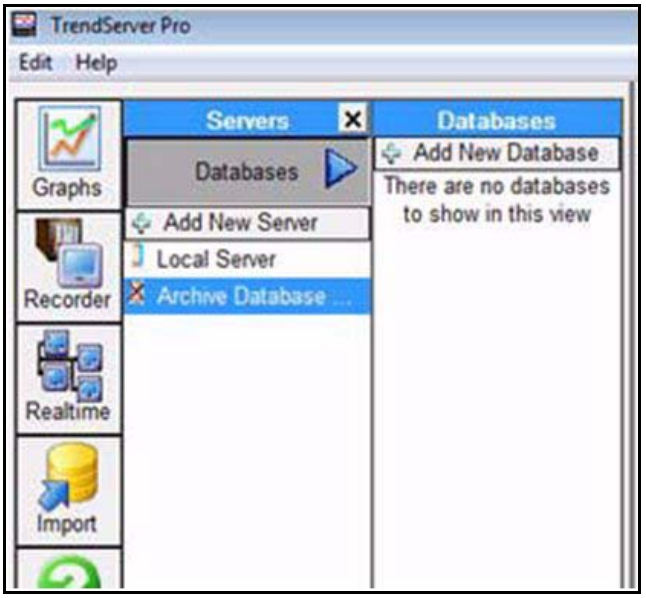
3. Check for “Archive Database Server” feature in database server list.

Steps to check for “Archive Database Server” feature:

a) Launch TrendServer Pro UI.

b) Click on Servers button.

c) We will see Archive Database Server along with Local Server. See the image below:



If “Archive Database Server” is not shown, please do the below steps:

1. Shut down Communications Service, please refer “Shutdown Server” for more details.
2. Start the Communications Service by opening Comms UI.

Trend Analysis Software User Groups after Migration

During ***Trend Analysis Software*** installation it creates one common group for all the variants i.e. **TMSApplicationAccessGroup** and for ***Trend Manager*** it creates another group called **TMSServiceAccessGroup.**

NOTE (For ***Trend Server*** only): **TMSServiceAccessGroup** is required for **Communications Service (and processes)** runs under it. Do not delete this user group and also do not modify/delete the user in the user group.

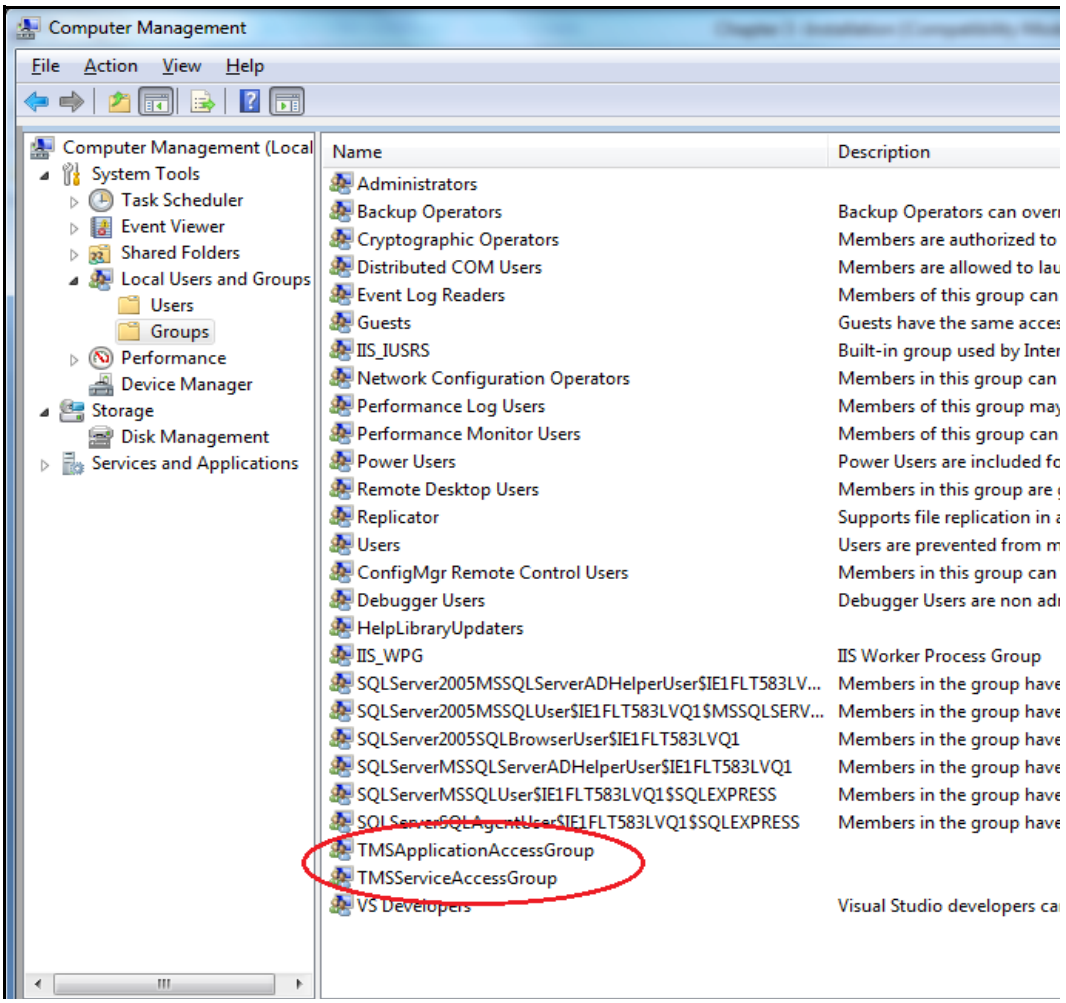
1. The user account provided during installation should be part of **TMSApplicationAccessGroup** for ***Trend Manager*** and will be part of **TMSServiceAccessGroup** in case of ***Trend Server***.
2. Any user who wants to access ***Trend Analysis Software*** application or permissions to enable the communication across computers should be added to the **TMSApplicationAccessGroup**.

Steps to check the group and add user to **TMSApplicationAccessGroup**:

a) Please go to Control Panel -> Administrative Tools -> Computer Management.

b) Select Local Users and Groups.

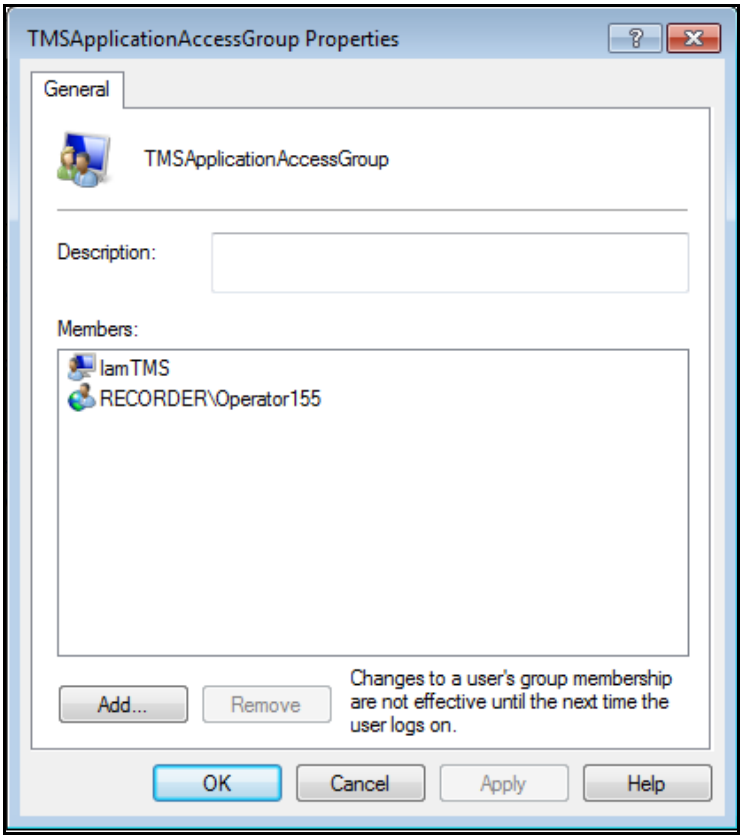
c) Go to Groups. And check for **TMSApplicationAccessGroup.**



d) Right click on **TMSApplicationAccessGroup**.

e) Select Properties. A list of users will be populated who are authorized to access ***Trend Analysis Software*** application.

f) Add any user you want to give authorize to access ***Trend Analysis Software*** application. (In below diagram, “Recorder\Operator155” has been added to **TMSApplicationAccessGroup)**.



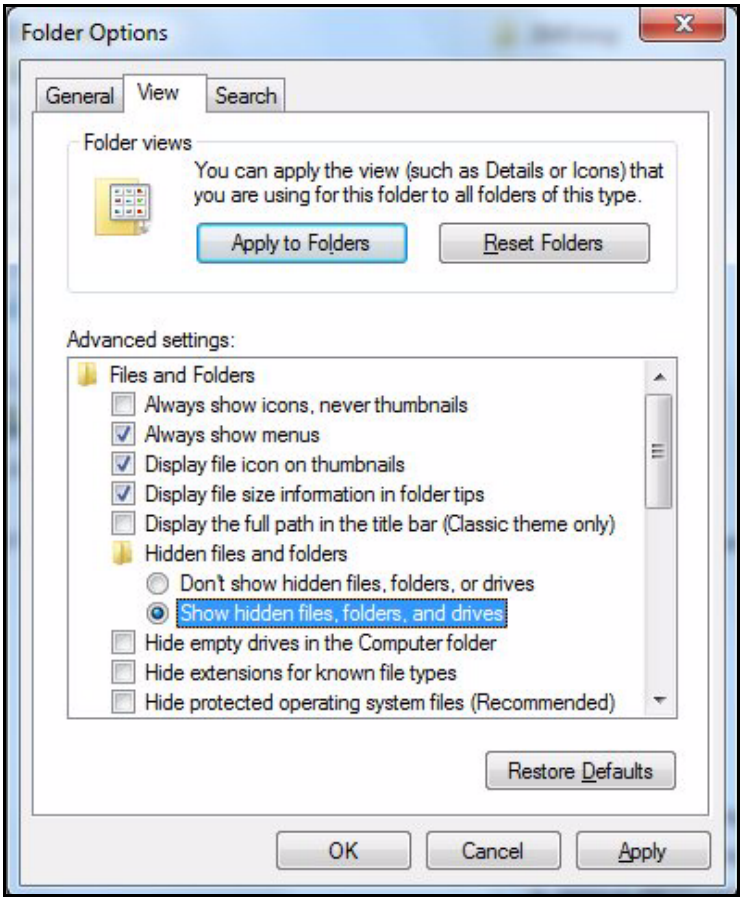
NOTE: Ensure below steps once user is added to “**TMSApplicationAccessGroup**” to access ***Trend Analysis Software*** application:

1. Check for “ ***Trend Analysis Software***”,”TMP” and “CommsServ” folders are present in the virtual store of given user. After locating the given folders in virtual store, take backup and **delete those folders from virtual store**. The virtual store is applicable for Windows Server 2012, Windows Server 2008, Windows 8 and Windows 7.

Steps are given below to locate virtual store folder for the user who is currently logged in the system. By default virtual store folder is hidden.

Steps to show hidden files

- Open explorer
- Go to the Tools -> Folder
- Click on View tab


Folder Options
General
View
Search
Folder views
You can apply the view (such as Details or Icons) that you are using for this folder to all folders of this type.
Apply to Folders
Reset Folders
Advanced settings:
Files and Folders
Always show icons, never thumbnails
Always show menus
Display file icon on thumbnails
Display file size information in folder tips
Display the full path in the title bar (Classic theme only)
Hidden files and folders
Don't show hidden files, folders, or drives
Show hidden files, folders, and drives
Hide empty drives in the Computer folder
Hide extensions for known file types
Hide protected operating system files (Recommended)
Restore Defaults
OK
Cancel
Apply

- Check the “Show hidden files, folders, and drives”. Click Ok. please see above image for reference
- Now, go to “C:\Users\<User Name>\ AppData\Local\VirtualStore. Under VirtualStore folder, “\Program Files \TrendManager Suite\TMP5DB”, “\Program Data\TMP” and “\ProgramData\commsserv” will be present. Or in case of 64 bit, this will be “\Program Files (x86) \ ***Trend Analysis Software*** \TMP5DB”.
- After locating them take backup and **delete the folders** “ ***Trend Analysis Software***”, **“TMP” and “Commsserv” from virtual store**.

2. Please logoff and login into the machine to access ***Trend Analysis Software*** application.

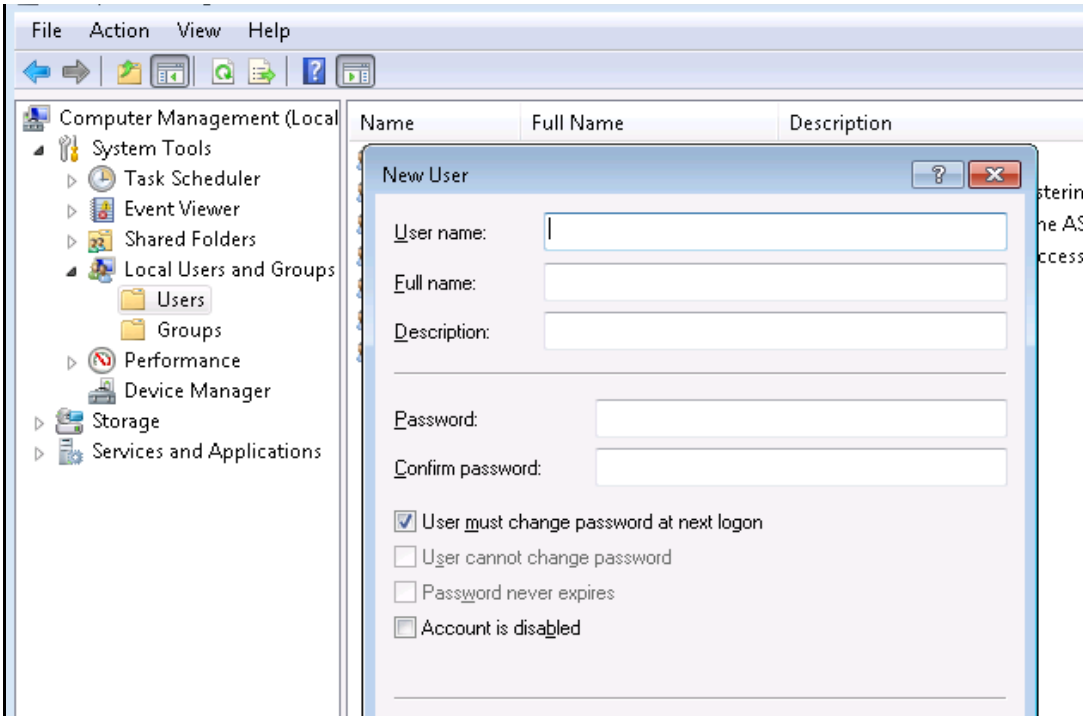
g) Any user trying to use the ***Trend Analysis Software*** Application from remote machine should be part of the “**TMSApplicationAccessGroup**” on the remote system. For ex: If ***Trend Server*** is running under Domain\User1 user on Machine A wants to access communications server of ***Trend Server*** running under Domain\User2 user on Machine B. Then Domain\User1 should be part of **TMSApplicationAccessGroup** of Machine B.
If a local user does not exists on the remote system then a new user with same username and password can be created on the remote system and be added to the **TMSApplicationAccessGroup** of the remote system in order to access communications server of the remote system.

Steps to create a new user:

a) Please go to Control Panel -> Administrative Tools -> Computer Management.

b) Select Local Users and Groups.

c) Right click on Users and Select “New User”. Below “New User” dialog appears.



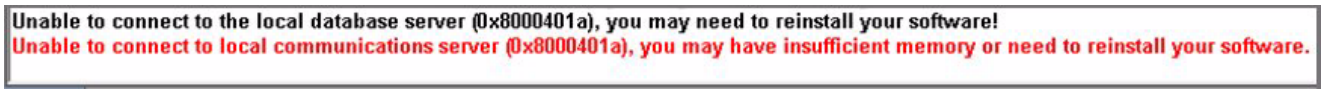
d) Provide User Name and Password. The new user will get created.

h) The Administrator/Non-Administrator users who are not part of **TMSServiceAccess-Group** or **TMSApplicationAccessGroup** will be able to use the ***Trend Analysis Software*** application if they are already configured with required settings like Windows privileges, folder access permissions and DCOM access permissions similar to the configured settings during ***Trend Analysis Software*** application installation.

i) During uninstallation, the **TMSServiceAccessGroup** and **TMSApplicationAccess-Group** are not deleted.

Troubleshooting for TrendManager Suite Application:

During the launch of ***Trend Analysis Software*** Application UI, if you see any of the below messages:


Unable to connect to the local database server (0x8000401a), you may need to reinstall your software!
Unable to connect to local communications server (0x8000401a), you may have insufficient memory or need to reinstall your software.

The above messages can be due to:

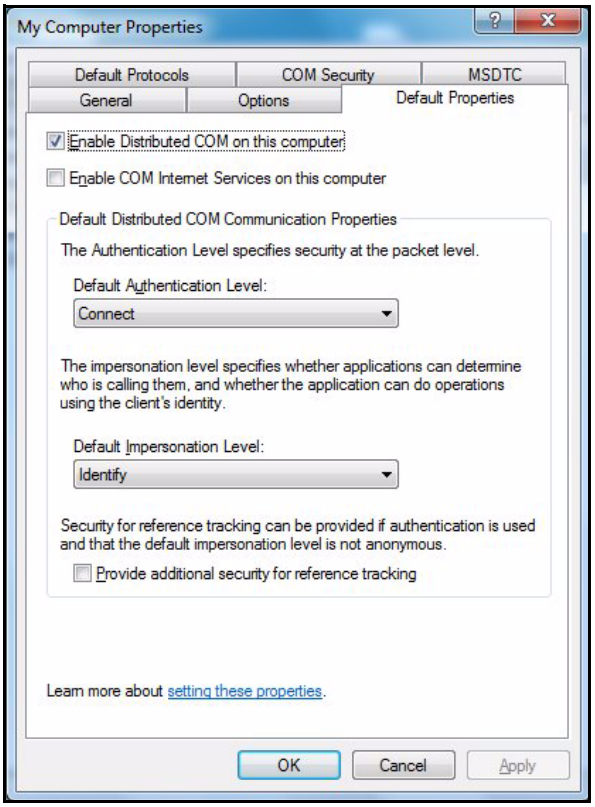
a) Password expiration for the given logged on user account, Use Security Configuration Utility for this. For more details, refer to"*"Security Configuration Utility" on page 34*".

b) If the user is not part of "TMSApplicationAccessGroup". For more details please refer to *"Trend Analysis Software User Groups after Migration" on page 25*.

c) ***Trend Server*** Application, if Commnunications Service is still not started after steps 1 and 2 have been applied, then copy the "TMS" folder of the logs for further understanding of the issue.

1. The TrendServer Pro uses Microsoft's DCOM to allow remote users to access data on other copies of the Manager and the Server software across networks Using TCP/IP. Please troubleshoot below steps if you are experiencing issues with remote communications.

   a) For all Windows versions : From "Start" select "Run" and type dcomcnfg.This will start "Component Services".Go to Component Services->Computers->My Computer. Right click on "My Computer" and select "Default Properties" tab. Ensure "Enable Distributed COM on this computer" is checked.


My Computer Properties
Default Protocols
COM Security
MSDTC
General
Options
Default Properties
Enable Distributed COM on this computer
Enable COM Internet Services on this computer
Default Distributed COM Communication Properties
The Authentication Level specifies security at the packet level.
Default Authentication Level:
Connect
The impersonation level specifies whether applications can determine who is calling them, and whether the application can do operations using the client's identity.
Default Impersonation Level:
Identify
Security for reference tracking can be provided if authentication is used and that the default impersonation level is not anonymous.
Provide additional security for reference tracking
Learn more about setting these properties.
OK
Cancel
Apply

b) Add TrendServer Pro client user or OPC client user to “TMSApplicationAccess-Group” who wants to access TrendServer Pro or TrendViewHistorian server machine. Refer to “TrendManager Suite User Groups after Installation” on page 13 for more details.

c) Try restarting both client and server; a restart should not be necessary if only the fire-wall option has changed, but a restart is needed to ensure that any DCOM configuration changes have been applied.

d) Temporarily switch off any firewall. If a firewall is in use, it must be restored after test-ing. Switching the firewall off will eliminate it is as a possible problem source.

e) Check network security settings and ensure DCOM traffic (port 135) is being allowed.

f) Attempt to establish a direct connection between the client and server by accessing the shared folder on either of the machines.

g) If the client will communicate only with a direct connection (as above) the security set-tings used on the client network need to be reviewed to ensure DCOM traffic is being allowed.

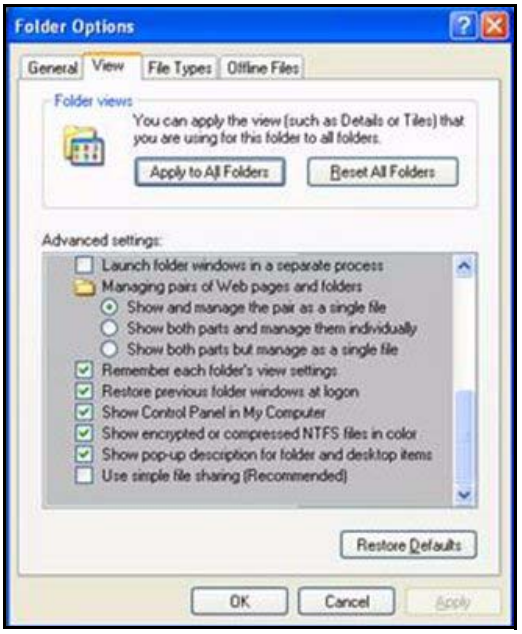
h) As a final check that DCOM traffic is not being blocked by the client network, a port scanner may be used to check the state of and access to port 135; this is not recom-mended for anyone unfamiliar with network technology. A basic (and safe) port scanner (PortQry) is available for down-load from Microsoft’s web site; a search on Microsoft.com for Portqry will locate the instructions for down-load and use, down-load-ing from any third party web site is not recommended.

i) Check to see if the client and server are in the same domain. If they are not in a domain,then following applies.

- Simple File Sharing (SFS) should be switched off on both client and server machines. Follow below steps to switch off SFS.

  •• Open windows explorer, go to the “Tools” menu and select the “Folder options…” menu item. This will present a dialog box as follows:

•• Select the “View” pane in order to be able to see some advanced settings. The “Folder Options” window will change to look something like the following:


Folder Options
General
View
File Types
Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Launch folder windows in a separate process
Managing pairs of Web pages and folders
Show and manage the pair as a single file
Show both parts and manage them individually
Show both parts but manage as a single file
Remember each folder's view settings
Restore previous folder windows at logon
Show Control Panel in My Computer
Show encrypted or compressed NTFS files in color
Show pop-up description for folder and desktop items
Use simple file sharing (Recommended)
Restore Defaults
OK
Cancel
Apply

Scroll to the bottom of the “Advanced settings:” area of the window and make sure that the “Use simple file sharing (Recommended)” option is not enabled. It has been disabled in the example screenshot above.

• The server machine must have the same user account configured as the client machine that is currently trying to run the Trend Server Pro software. The password for the user account must be the same on both machines.

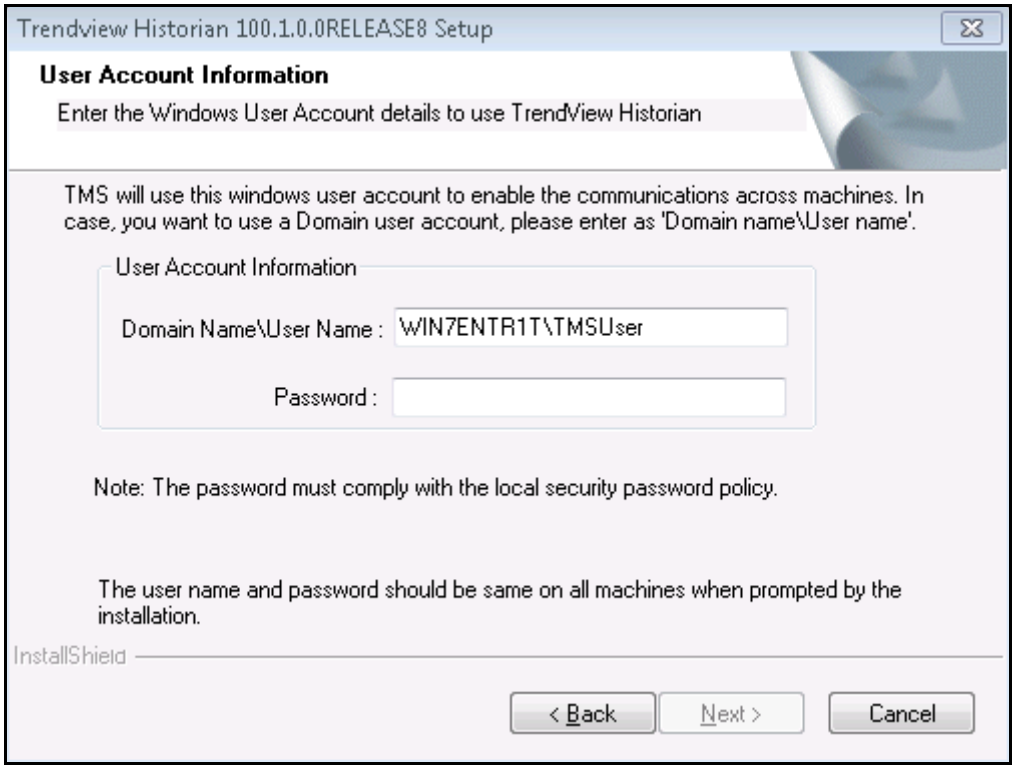
Installation or Migration of *Trend View* Historian:

Prerequisites:

Ensure that ***Trend Analysis Software*** is installed in your machine.

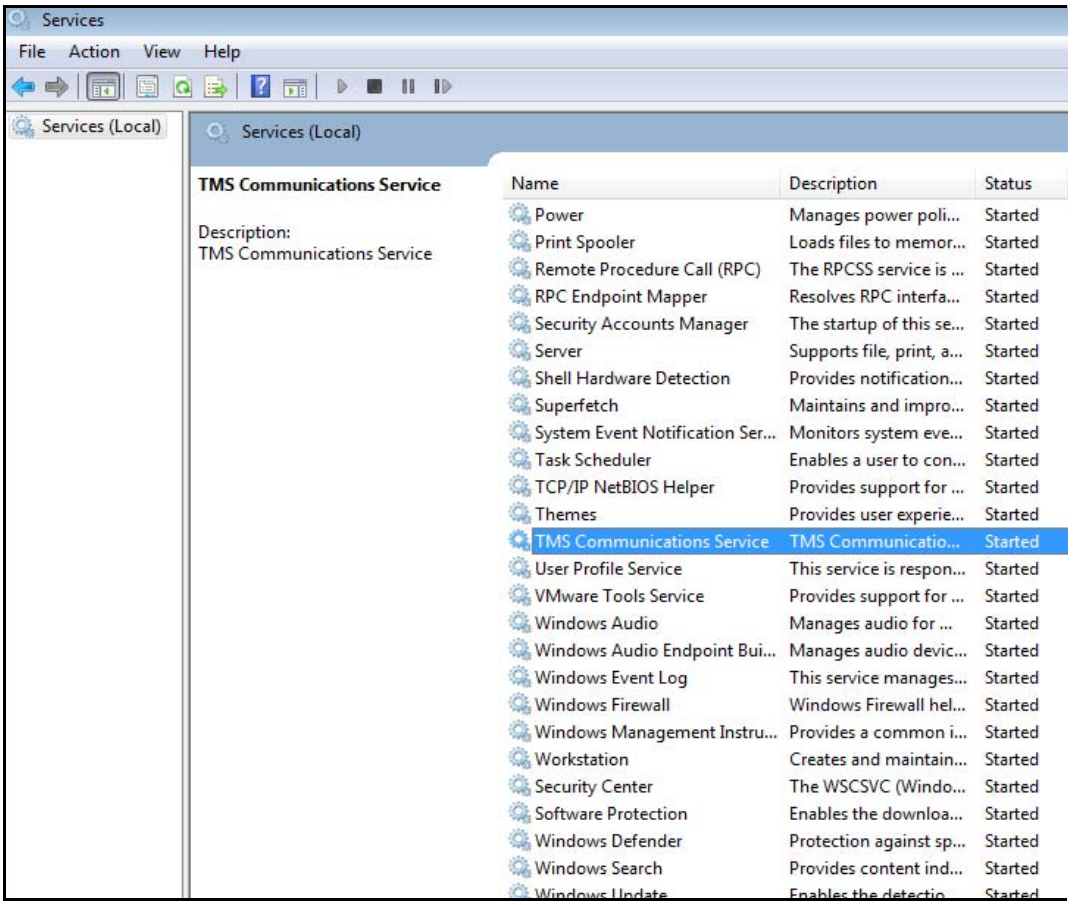
To Install/Migrate *Trend Viewer* Historian:

- Log in with Administrative privileges.
- Launch Setup.exe. The ***Trend View*** Historian - InstallShield Wizard appears.
- Click Next and accept the terms of “License Agreement of ***Trend Analysis Software*** Software” to proceed further.
- Click Next. The Choose Destination Location window appears, displaying information about the default destination folder. If you want to change the default destination folder, click Browse to specify a different destination folder.
- Click Next. The Edit Data window appears to enter the code and organization as supplied with each specific version of software. The code can be found inside the DVD case for ***Trend View*** Historian.
- Click Next. The below User Account Information Window appears, then follow the on-screen instructions.


Trendview Historian 100.1.0.0RELEASE8 Setup
User Account Information
Enter the Windows User Account details to use TrendView Historian
TMS will use this windows user account to enable the communications across machines. In case, you want to use a Domain user account, please enter as 'Domain name\User name'.
User Account Information
Domain Name\User Name :
WIN7ENTR1T\TMSUser
Password :
Note: The password must comply with the local security password policy.
The user name and password should be same on all machines when prompted by the installation.
InstallShield
< Back
Next >
Cancel

It is preferred to use the same user account that *Trend Analysis Software* application is running.

Check the User account where Communications Service is running. It can be found by going to Control Panel -> Administrative Tools -> Services and will see below screen where you can see the user account under “Log On As”.



To run ***Trend View*** Historian under a different account or on account of expiry of a password, use Security Configuration Utility which is a part of the ***Trend Analysis Software*** installation. For more details, refer to “*“Security Configuration Utility” on page 34*”.

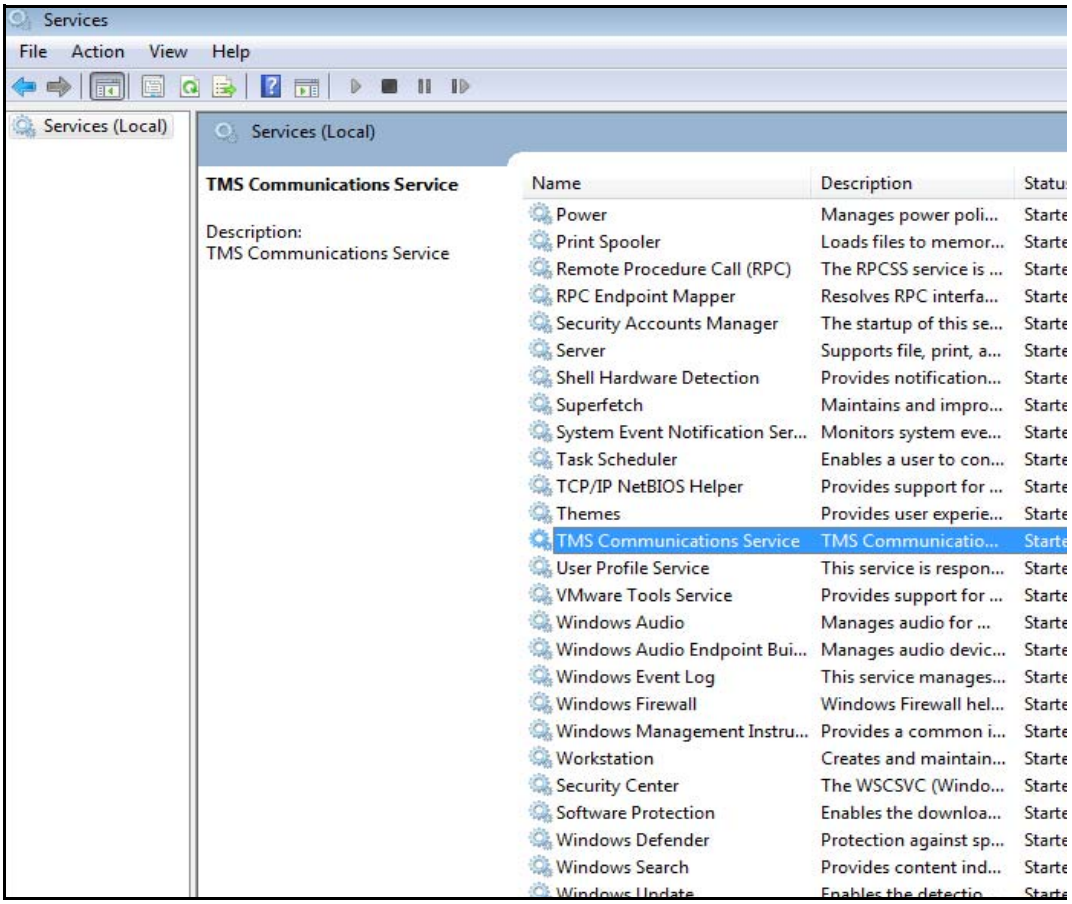
- Click Next. The below Ready to Install the Program Window appears.
- Click Install. The setup starts installing all the prerequisites if they are not installed. The Setup Status page appears displaying the installation status. After the installation is complete, the Setup complete page appears. Click Finish.

Security Configuration Utility

This utility is available as part of the installation of ***Trend Manager*** and ***Trend Server***. It is present in the ***Trend Analysis Software*** installation folder.

Before launching **Security Configuration Utility** follow the below instructions:

1. Ensure that you have Administrative privileges.
2. Ensure that ***Trend Analysis Software*** application is not running and also services are stopped. To shut down the services, please refer to “Shutdown Server”.
3. Check for the **VirtualStore** folder for the given user and take back up of it. For more details refer to the v**irtualstorebackup**.
4. Check for user account under which Communications Service is running. It can be done by going to Control Panel -> Administrative Tools -> Services and will see below screen where you can see the user account under “Log On As”.



About Security Configuration Utility:

1. The ***Trend Analysis Software*** Security Configuration Utility (TMSSecurityCfg.exe) is a standalone application intended to reset an existing account in case the password has been changed or another account needs to be set for ***Trend Analysis Software*** Application or ***Trend View*** Historian. The Security Configuration Utility is shown below.

C:\Program Files\TrendManager Suite\TMSSecurityCfg.exe
TMS Securtiy Configuration Utility is meant for resetting
User account to use the TMS application
Note: This utility can be used to reset an existing account incase
password has been changed or other account to be set for TMS Application
Please select an option to continue with this utility:
1 - Set User account for TMS Application
2 - Set User account for TrendView Historian
0 - Exit
Enter your Option: 1
Enter the User Account details
Domain User: please enter as "Domain Name\User Name"
Local User: please enter as "User Name" or "Machine Name\User Name"
Note: Same user account should be used on another TMS Installed System
for remote communications
Enter DomainName\UserName:

2. You need to provide valid user credentials that are intended to use with ***Trend Analysis Software*** or ***Trend View*** Historian.
3. To change the user account under ***Trend Analysis Software*** or ***Trend View*** Historian it should be provided in the following format:

a) For Local user account format –"User Name" or "Machine Name\User Name".
Steps to check for "Machine Name":

- Go to Start Menu>Control Panel> Start > Control Panel > System.
- You will see "Computer name" which is also "Machine Name".

b) For Domain user account format – "Domain Name\User Name". For this account if you provide wrong password depending upon the domain policy, the account may get locked after multiple tries.

4. On change of password for the given user account, under which ***Trend Analysis Software*** or ***Trend View*** Historian is running, it should be changed using the Security Configuration Utility to make them run under that user account.

NOTE: Re-start of the system is mandatory to apply above changes.

Access OPC DA/HDA Server

Trend Server has an OPC DA Server named ' ***Trend View*** .OPC.1' and ***Trend View*** Historian has an OPC HDA server named 'Hci. ***Trend View*** -Historian'.

Follow below steps to connect to either of these servers using an OPC Client

1. If the OPC client is installed on the ***Trend Server*** machine, ensure that the windows user trying to launch OPC client is added to "TMSApplicationAccessGroup". Refer to ***Trend Analysis Software*** User Groups for more details.
2. If the OPC client is trying to connect to the OPC server, from a remote machine, please follow guidelines provided by OPC vendor. The following additional steps should be completed before accessing OPC server.

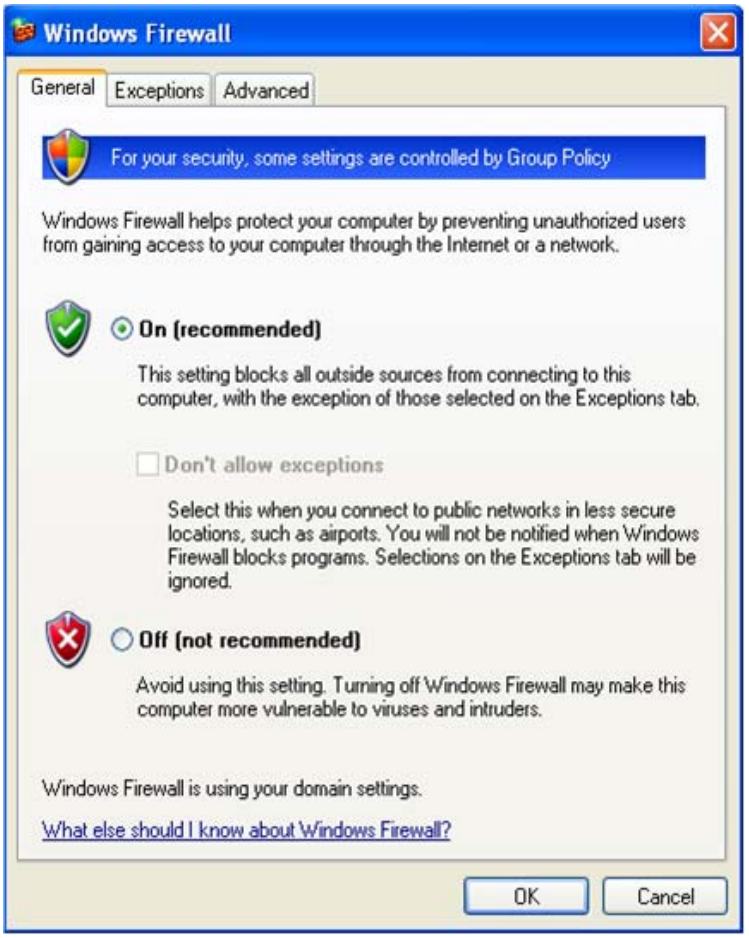
NOTE: For Matrikon OPC Client, the documents and guidelines can be found at following location *"http://www.matrikonopc.com/dcom-configuration-opc.aspx"*

a) Add OPC client users to "TMSApplicationAccessGroup" on the ***Trend Server***/ ***Trend View*** Historian Server machine. Refer to *"Trend Analysis Software User Groups after Migration" on page 25* for more details.

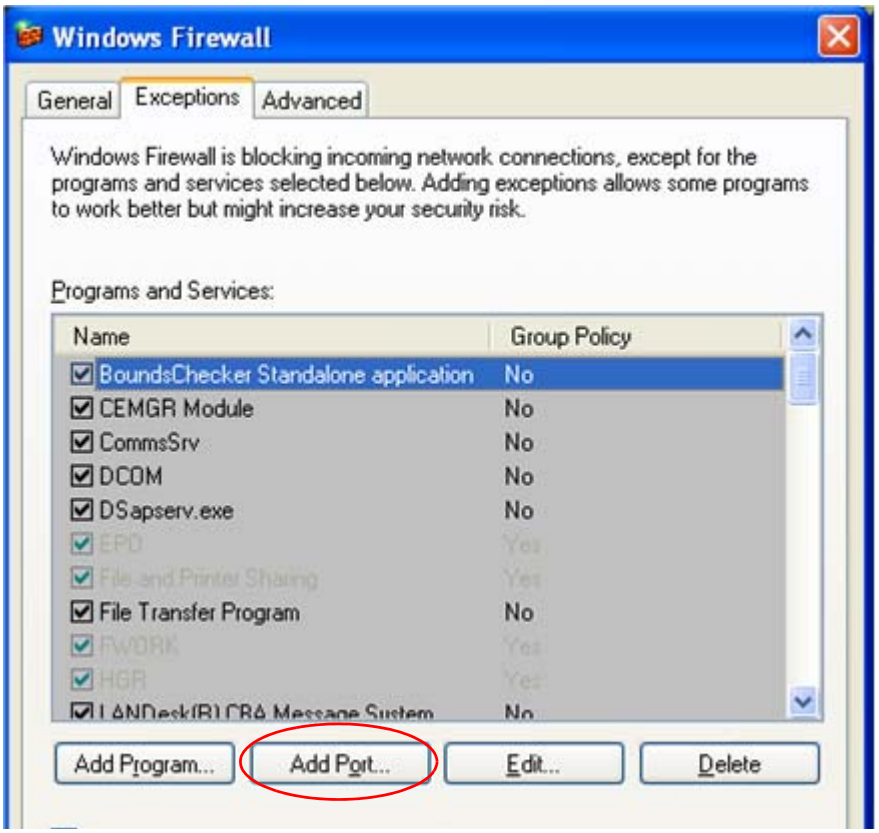
b) If OPC client is still not able to access OPC server, please refer to *"Troubleshooting for TrendManager Suite Application:" on page 29*:

Firewall settings on Windows XP

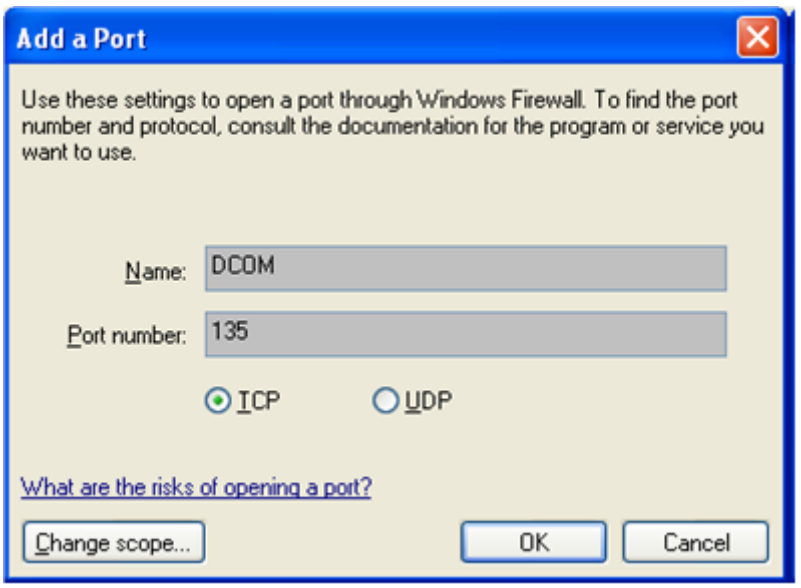
1.The following window will be shown if the firewall is on


Windows Firewall
General
Exceptions
Advanced
For your security, some settings are controlled by Group Policy
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
Windows Firewall is using your domain settings.
What else should I know about Windows Firewall?
OK
Cancel

2.Add an exception rule to permit the port connection for DCOM. Navigate to the “Exceptions” Settings. Clicking on the “Exceptions” tab would show something similar to the following



3.Now click on the “Add Port…” button to display the following dialog box


Add a Port
Use these settings to open a port through Windows Firewall. To find the port number and protocol, consult the documentation for the program or service you want to use.
Name:
DCOM
Port number:
135
TCP
UDP
What are the risks of opening a port?
Change scope...
OK
Cancel

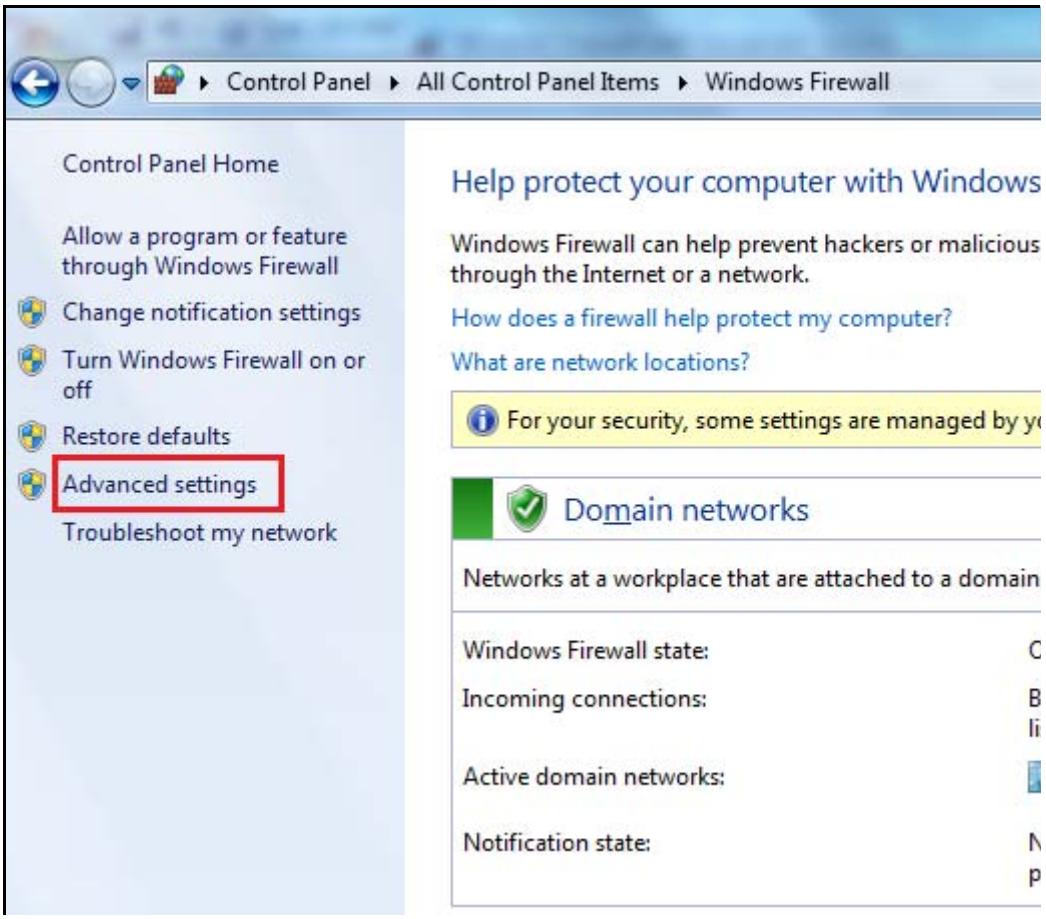
Enter “DCOM” in the “Name:” field and “135” in the “Port number” field. Ensure that the “TCP” radio button is selected and then click on the OK button to add the rule and return to the Windows Firewall box.

4.Ensure that the “File and Printer Sharing” is switched on, which is the highlighted option in the Screen shot below

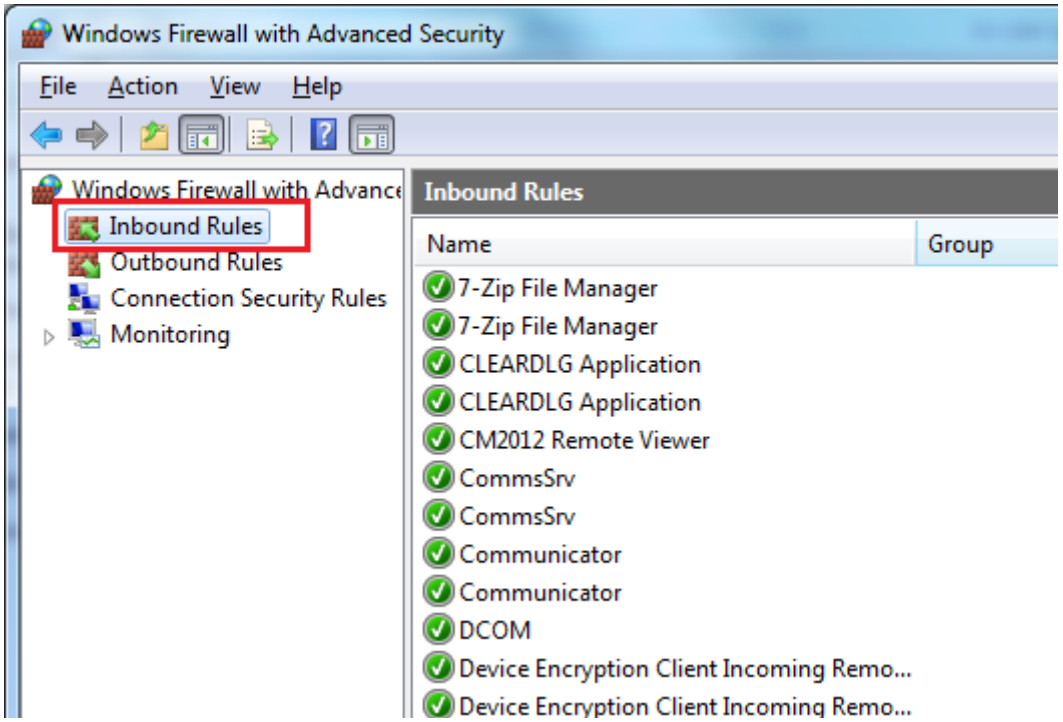
Windows Firewall
General
Exceptions
Advanced
Windows Firewall is blocking incoming network connections, except for the programs and services selected below. Adding exceptions allows some programs to work better but might increase your security risk.
Programs and Services:
Name
Group Policy
File and Printer Sharing
Yes
File Transfer Program
No

Firewall settings on Windows 7

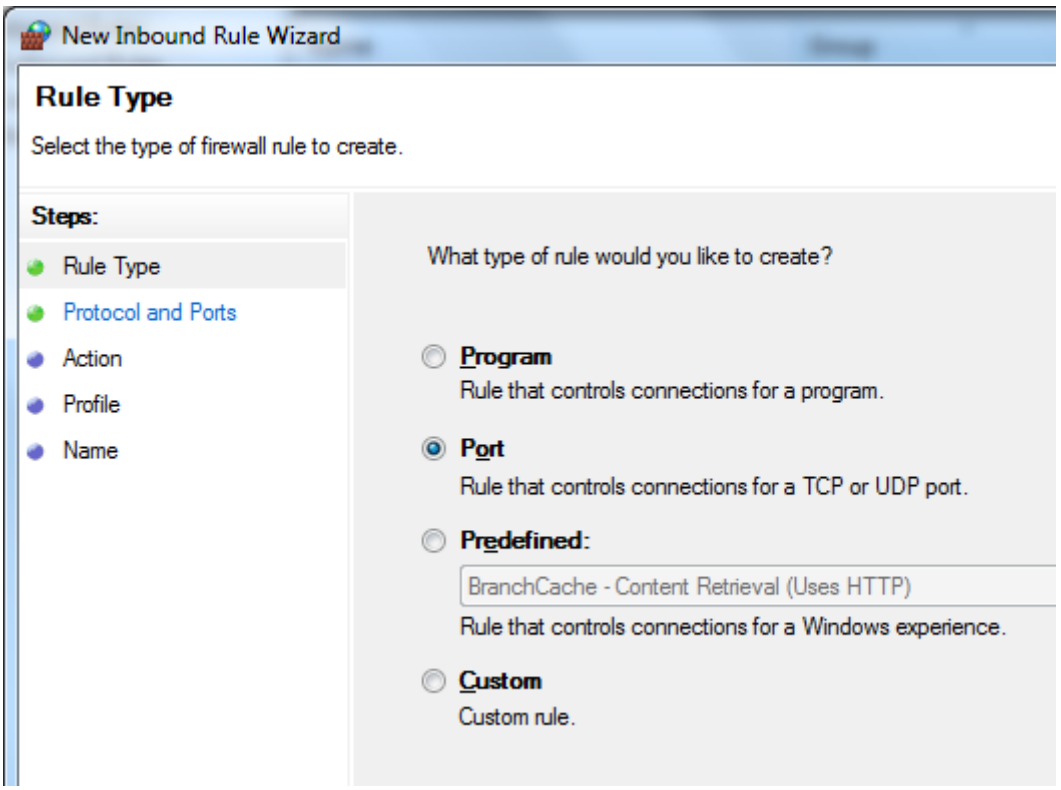
1. Select “Advanced settings”.


Control Panel
All Control Panel Items
Windows Firewall
Control Panel Home
Allow a program or feature through Windows Firewall
Change notification settings
Turn Windows Firewall on or off
Restore defaults
Advanced settings
Troubleshoot my network
Help protect your computer with Windows
Windows Firewall can help prevent hackers or malicious through the Internet or a network.
How does a firewall help protect my computer?
What are network locations?
Domain networks
Networks at a workplace that are attached to a domain
Windows Firewall state:
Incoming connections:
Active domain networks:
Notification state:

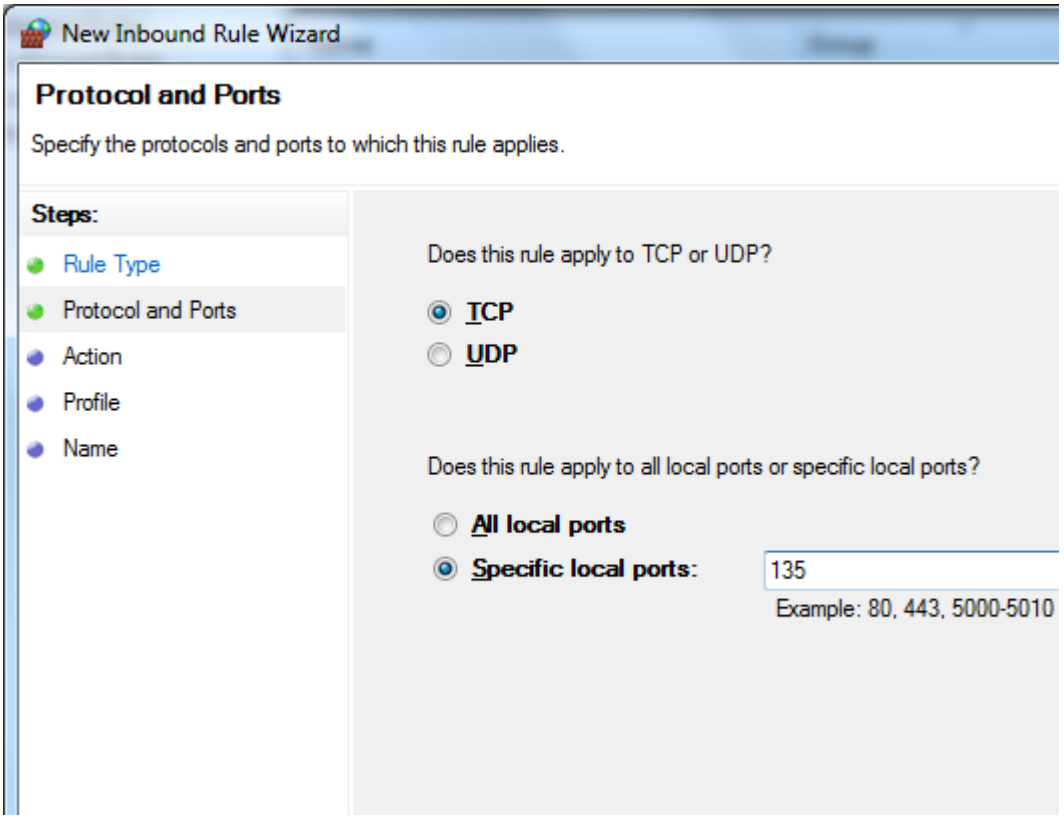
2. Click on Inbound Rules -> New Rule



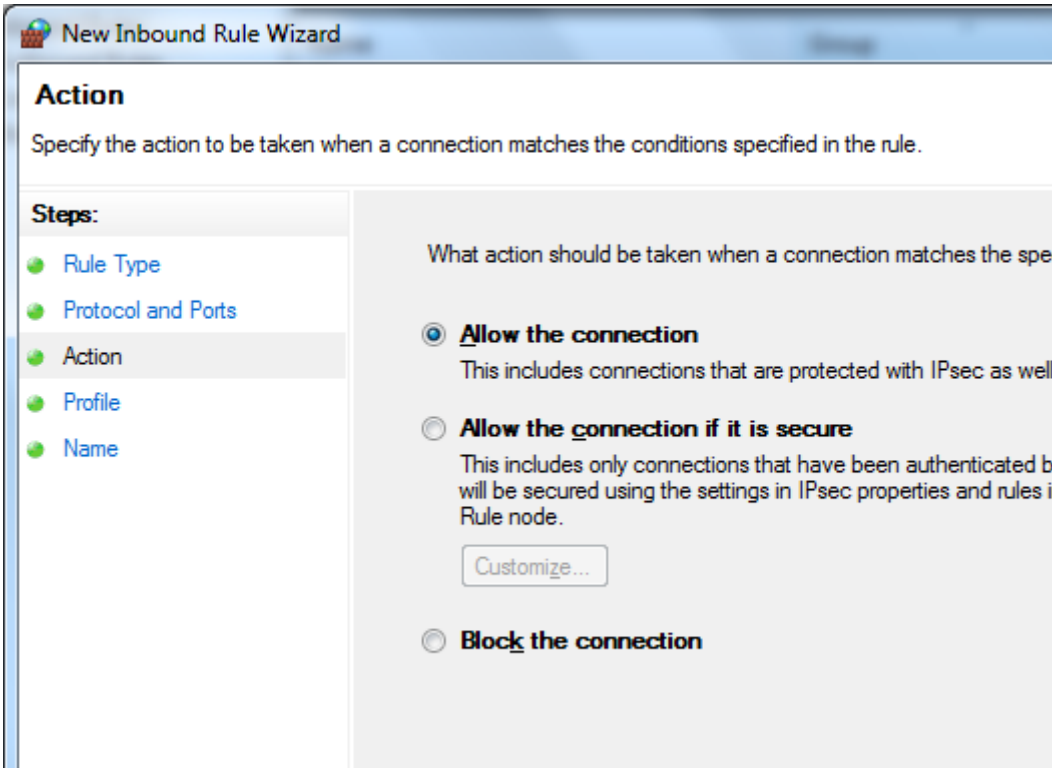
3. Select Port and click on Next



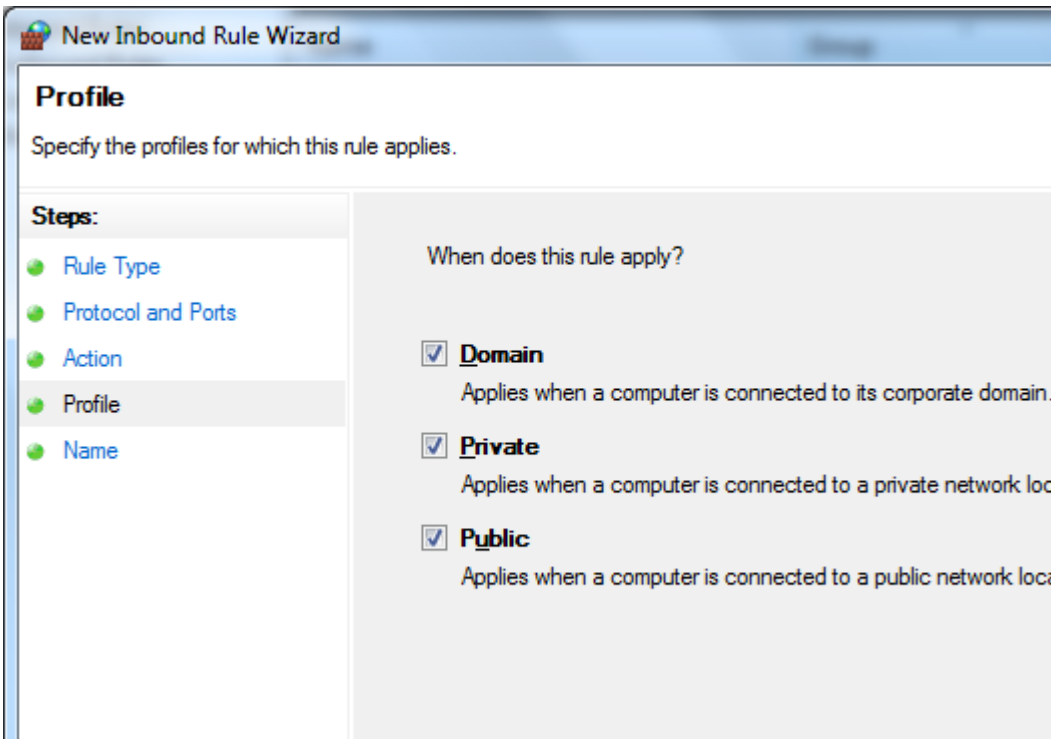
4. Select TCP Port, specify port no 135 and click on Next



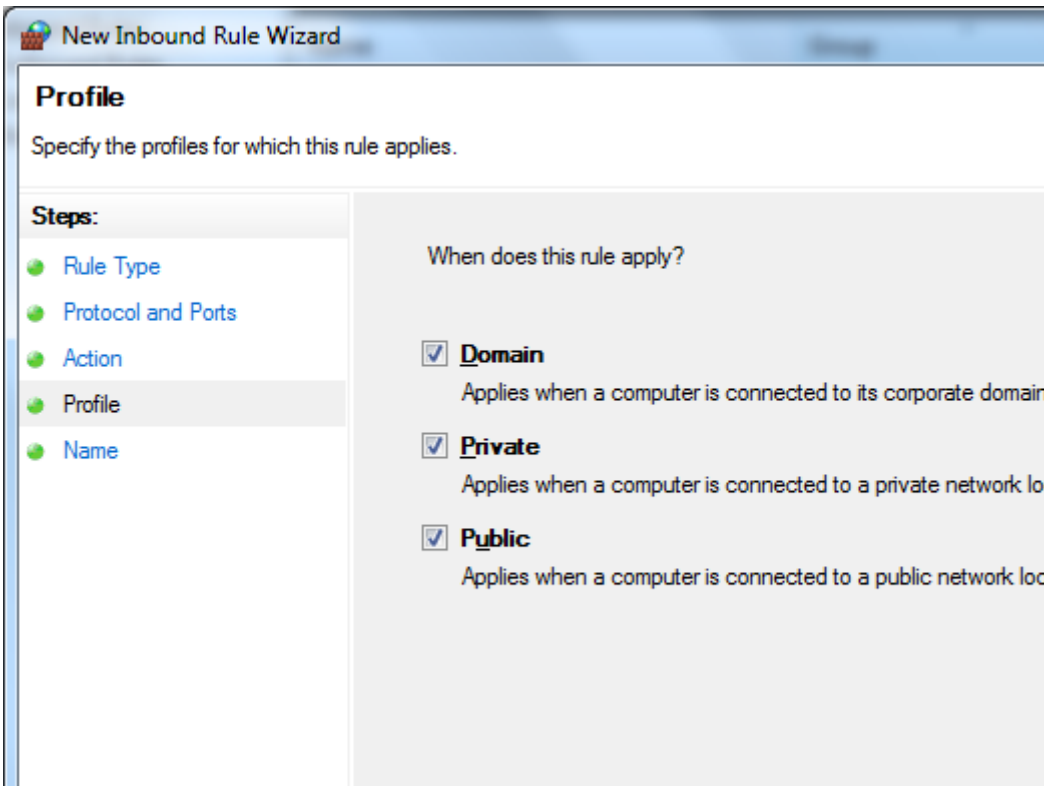
5. Select “Allow the connection” and click on next


New Inbound Rule Wizard
Action
Specify the action to be taken when a connection matches the conditions specified in the rule.
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
What action should be taken when a connection matches the spe
Allow the connection
This includes connections that are protected with IPsec as well
Allow the connection if it is secure
This includes only connections that have been authenticated b
will be secured using the settings in IPsec properties and rules i
Rule node.
Customize...
Block the connection

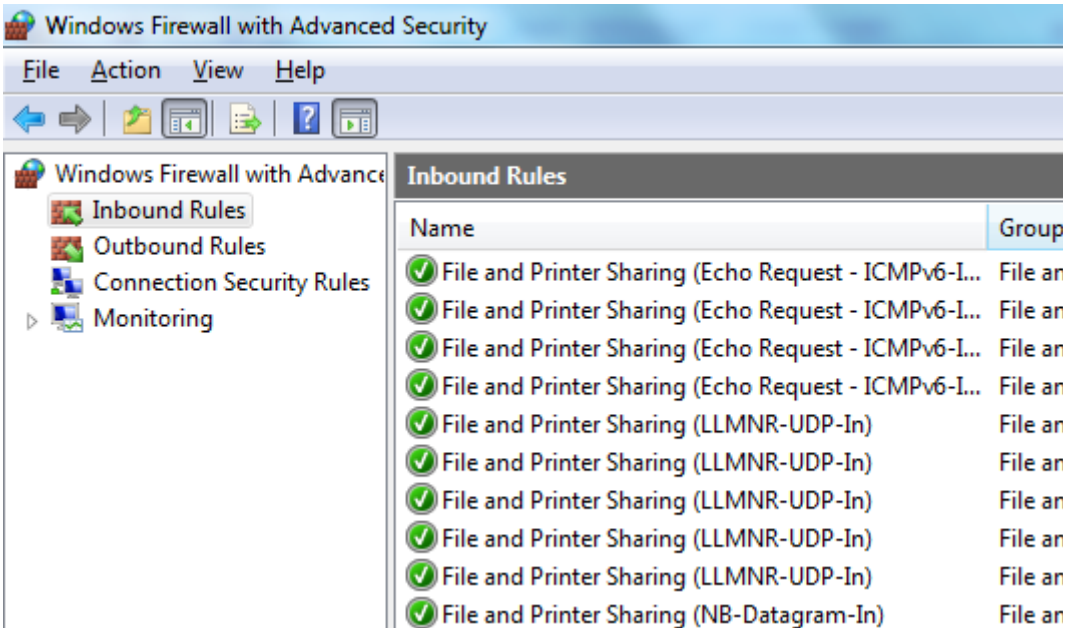
6. Select the profile and click on Next



7. Specify name and description for the port rule and click on Finish



8. Make sure “File and Printer sharing” allowed



Machine Name

The Machine name (Computer name), can be found by going to the computer properties. On your PC go to Start > Control Panel > System, This will produce the Computer properties screen.

On this screen you will see the Computer name (Machine name): Eg. IE1FLT4XDW9R1

Documentation

A full set of manuals for the software and the recorders (including some language versions) are available on the DVD provided Also Application Notes and Installation Instructions, first time password setup and database tool information.

Batch Mode

The Batch Mode functionality will automatically install as a part of ***Trend Manager*** and ***Trend Server.*** Batch is a firmware option that can be activated using the credit system in the **X Series** and **GR Series** recorders.

The Batch function allows the user to segment portions of data for further analysis. Setting up a batch requires information to identify and control batches of data. Batch data can also be paused, for viewing, and resumed. Batch mode allows concurrent batches, where each batch is associated with a group, so all pens within Group 1 will belong to the batch that is controlled by Group 1. *Concurrent batch is not available on ***100mm and 180mm*** recorders.

Database Management Tool

The Database Management Tool software is a separate software application that is provided for use with ***Trend Server***. It provides the user with the ability to back up, sort, archive, move and copy the data stored by ***Trend Manager*** and **Trend Server** software.

From the DVD the Database Management Tool will automatically install. Follow the on screen instructions. Enter your organisation and code (code found on the DVD case). From the three types of installations Typical is recommended. The software will install into C:\Program Files\ ***Trend Analysis Software***\Database Tool.

Modbus Profile Tool

The Modbus Profile Tool can be used to edit existing Modbus profiles or create new Modbus profiles. It can also be used to export Modbus profiles from one system so that they can be imported into another system. It is generally aimed at enabling the setup of Modbus communications with other devices that support floating point input registers in their Modbus memory map.

The Modbus Profile Tool is available with **Trend Server**. It will install automatically and can be activated from the same location as **Trend Server** software.

The Modbus Profile Tool can be opened by going to **Start > Programs > *Trend Analysis software* Modbus Profile Tool.** The Modbus Profile Editor window will open with empty files ready for a new profile to be created. For more information, see *"The Modbus Profile Tool" on page 294*.

Report Generation Tool

This is a separate software package, it is not part of ***Trend Analysis Software*** and uses its own install process and codes

PC software that uses a TUS data file generated by either **Multitrend SX or MultiTrend GR3** recorders to generate a temperature uniformity survey report. It produces a report that documents the uniformity performance of a furnace based on the AMS2750 specification.

Trendview Historian

PC software that extracts data from ***Trend Analysis Software*** databases and communicates with various OPC HDA Clients (e.g. Matrikon) to analyze the Historical data of recorder. A separate unlock code is required to activate this software.

Trend Analysis Software installation is mandatory when using **Trendview Historian**.

Start Up

The ***Trend Analysis Software*** has been installed on the Hard drive of your computer in 'program files' unless during set up you have changed the destination folder.

To re-start the software, click on 'Start', go to Programs and select ***Trend Analysis Software***, then select either ***Trend Server, Trend Manager*** or ***Trend Viewer*** according to which type of software option has been purchased. A shortcut for your desktop is automatically created.

Comms Server - Start up

The Comms server can only be opened using Start Menu of your PC, follow the path shown in *"Comms Server - Start up" on page 183*. Select Communications Server, then once opened it will appear as an icon in the system task bar in the bottom right of the PC Screen.
Note: Data will not be gathered until the Comms Server is activated from the Start Menu.

Help

The ***Trend Analysis Software*** has a comprehensive on-line Help facility which includes detailed instructions on 'How to do things' and explanations of all application areas. The help system is generic to product names and there is a section at the beginning of the help files on identifying recorders. There is also advise on how to use the Help system included in the ***Trend Analysis Software*** Help Index.

System Requirements

Trend Viewer requires the following minimum specification:-

- 1GHz Pentium lV processor or higher
- CD - ROM drive, a mouse
- Monitor recommended screen resolution 1024x768 minimum requirement, high colour.
- Microsoft Windows™ XP, Windows™ 2003 server with Standard, Edition, Windows™ Vista with Business and Ultimate Edition only and Windows 7 (32 bit – Professional and Ultimate Edition - 64 bit), Windows 8 (32 bit- Enterprise, Professional and Ultimate Edition -64 bit), Windows Server 2008 and Windows Server 2012..
- 4GB or more of RAM (min 4GB recommended)
- 16 bit colour graphics, 24 bit recommended (Screen Designer only)
- 50 Mbyte hard disk free disk space
- Flash card reader or USB port for **X Series**recorders
- 3.5” floppy disk drive or PCMCIA for **older**recorders

For Trend Server and ***Trend Manager*** the following minimum specifications apply:-

- 1GHz Pentium lV processor
- CD ROM drive, a mouse
- Monitor recommended screen resolution 1024x768 minimum requirement, high colour.
- , Windows 8 (32 bit- Enterprise, Professional and Ultimate Edition -64 bit), Windows Server 2008 and Windows Server 2012. Window 7* (32 and 64 bit -Professional, Enterprise and Ultimate Edition)**, Windows Server 2008, Windows TM Vista, Windows XP, Windows Server 2003.
- 4GB or more of SRAM (min 4GB recommended for generating IQOQ reports)
- 2 Gbyte hard-drive free disk space
- TCP IP installed
- Flash card reader or USB port for **X Series**recorders.
- 3.5” floppy disk drive or PCMCIA for **older**recorders

Note** (For ***Trend Server only) :

1. Secure Communications Interface is supported by Windows 7 and higher. This Secure Communication Interface only work with **GR Series** recorders with "SecureWSD" credit option enable.
2. For Windows 7 : We need Win 7 SP1(32 bit - Enterprise, Ultimate, Professional-64bit) as a prerequisite for Secure Communications Interface.
3. To use Secure Communications Interface we need to download the required OS 32 or 64 bit patch as per your machine OS from the link "*http://support.microsoft.com/kb/2860842*" and install it.

Below are two links to Microsoft Patch's for Secure Communication between recorders and ***Trend Analysis Software*** . These need to be installed on Win-7, SP1. Once the installation is completed on Win-7 PC, this patch needs to be installed.

Microsoft Link to download the patch: "*http://support.microsoft.com/kb/2860842"*

After download. Double Click the zip file. Provide a path to extract the application to install the patch. Once done double the application to install the patch.

TCP/IP = Transmission Control Protocol/Internet Protocol is the main transport protocol used on the Internet for connectivity and transmission of data across heterogeneous systems.

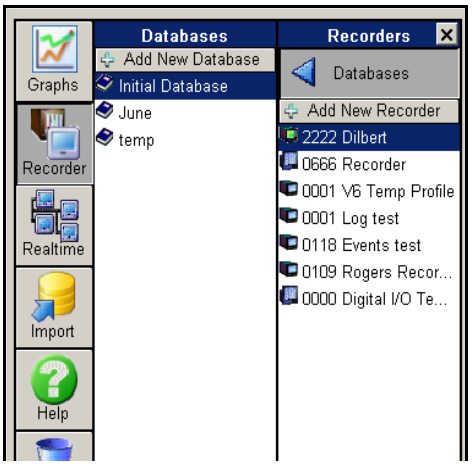
With all **the** software, performance improves with more RAM, faster CPUs, and faster and larger hard disk drives.
NB. It is recommended that at least 100 Mbyte of free hard disk space is available for archiving data. Please note the more logging and data being stored, the more free space on the hard disk is required. This is not required with ***Trend Viewer.***

Chapter 4: Operation

Operation

When the ***Trend Analysis Software*** is first opened, most of the PC screen will be blank apart from a *Button bar* down the left side of the screen.

Button bar



The ***Button bar*** appears down the left hand side of the screen. From here recorders can be fully configured (not available on ***Trend Viewer***). This is the main control area for the recorder, graphs and databases. Clicking on either the ***Graphs*** button or the ***Recorder*** button will reveal a slide out pane from which further selections can be made.
The Graphs button in ***Trend Viewer*** will reveal a slide out pane from which further selections can be made (To show one graph).
Realtime (available on ***Trend Server***) lists recorders available on the communications server. Both the ***Import*** and the ***Help*** button will produce message boxes.

The *System* and *Server* buttons, available on ***Trend Server*** only.

Graphs button

Activate this button to show the ***Graphs Slide out Pane*****.** From here graphs can be added and stored. Click on ***Add new Graph*** and instructions will appear. Click on the ***Folders*** heading and a further slide out bar appears. This is a list of ***Folders*** in which the user can organise their graphs.

Recorder button

The recorder button activates the ***Recorders Slide out Pane*** which is the main area of control for the recorder and databases. Click on ***Add New Recorder*** and a ***Select new device*** box will appear. Click on the ***Database*** heading and select ***Add New Database***, a message box will appear for the new details to be entered. This will help the user organise their recorders.

Realtime Communications

Available with ***Trend Server*** only.

Left click on the ***Realtime*** icon from the tool bar down the left side of the main screen. This will produce the ***Recorders pane*** displaying the recorders that are available on the communications server. From here the user can also see which server the comms server is using, which pens are available on each recorder and the comms server status.

Import button

Use the ***Import*** button to retrieve data or import a setup from an external storage device only. This button will implement the ***Import Settings Window*** which will allow the user to browse for network data or data from a device media (disk) and import into a database. Before importing a setup or data please read *"Importing" on page 155.* For ***Trend Server*** only, the facility to Import data from other recorders using TCP/IP Ethernet connection is available see *"Importing via FTP or Secure Communications Interface" on page 156*.

Help button

The ***Trend Analysis Software*** Help Index contains everything you need to know for configuring the recorder, including a ***How to do things*** section, ***Parts of the program*****,** plus ***Technical papers*** and ***Contact information***. This Help button will access the general help file. For recorder specific help, select the item on the screen under enquiry and press F1 on the keyboard. *See "Help Files - Trend Analysis Software" on page 51.*

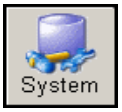
Trash Can button

Drag items such as recorders, pens or graphs, over the ***Trash*** icon and let go to delete. Note there is no undo facility.

Batch button

The Batch button will open the Batch View window. This will display the Batch data for all the recorders in the currently selected database.
Not available on ***Trend Viewer***.

System button



The ***System*** button, only present on ***Trend Server***, produces the ***System Control pane*** giving three options. First is the ***Password***, click anywhere on the icon or the text. This will generate the ***Password control*** message box. Click on the ***Status*** icon or text to generate the ***System Status*** message box. Select the ***E-mail*** icon to produce the E-mail settings window.

Server button

This is the central control area for the remote connections, only available with ***Trend Server***. Click on this button to reveal the ***Server Slide-out pane***. This is a list of servers available, click on ***Add New Server*** to generate the ***Add New Database Server*** message box. Click on ***Database*** to produce the ***Server Database List*****.** This list displays the databases available on the current server. After installation of ***Trend Server***, the server tab will dispaly both Local server and Archive Database Server by default. Select Archive Database server and click on Database to add a archive database.

Chapter 5: Help in the Trend Analysis Software

Help Files - Trend Analysis Software

This Help system has been created in a generic format for use with various applications. Take a moment to look at the first page few pages of the help system to identify which type of software and recorder you have.

Help in ***Trend Analysis Software*** can be used in various ways. The help button takes you to the ***Trend Analysis Software*** Help Index. This consists of:

- How to do things
- Parts of the program
- Technical papers

Place the cursor over the desired heading, ***Trend Analysis Software*** changes the appearance of the cursor to a finger pointing hand. Click on any of these headings in the help menu to activate the list.

Context sensitive help files

The method of entry through using the Help button will access the general help file. For specific help relating to a particular feature of the software application, click in the area on the screen and press F1 on the keyboard.

How to do things

This section is divided into two categories: ***'General Things'*** and ***'Graphing Things'***. Select the desired help option by passing the cursor over the top, it will turn into a hand. Click on the required option to reveal detailed instruction on your chosen task. Follow the instructions shown and press X in the top right corner to close.

Parts of the program

Click on this to reveal the ***Application Areas*** split into the following categories. ***Button Bar, Message Boxes, Graphing*** and ***General*****.** Place the cursor over the help topic desired and click to activate the instructions on that particular task.

Technical papers

This will access technical information relevant to your particular software.

Searching in Help

Within each help topic there are different ways to search for information. The top of each help screen shows the same menu bar throughout.

Find

This takes you to the ‘Find set up Wizard’, follow the on screen instructions. This will enable the user to find a particular word or scroll through the alphabetical topic screen. By clicking on the tags at the top of the Help Topic menu the user can view the Index or Contents file.

Help Topics

This takes the user to the Help Topics menu where Find, Index and Contents files can be accessed. Select option and press display.

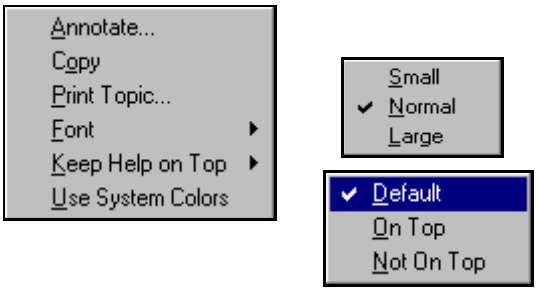
Back

This takes the user back to the previous screen.

Print

Direct access to printing any of the help screens.

Options



The final two options at the top of the help menu are shown as arrow direction buttons, these will take you either to the previous page or the next page.

- Annotate allows the user to type any additional information associated with this topic.
- Copy allows the user to copy the screen.
- Print topic gives direct access to print the screen.
- Font size can be changed.
- Help can be set on top or not on top.
- Use system colours will require help to be re-started.

Chapter 6: Recorder Configuration from Trend Analysis Software

X Series and GR Recorders

Trend Analysis Software allows you to set up a recorder from your PC.

NB. If any function is denied by a flashing padlock, this is because a password is required to be entered to proceed any further, see *"Passwords" on page 173.*

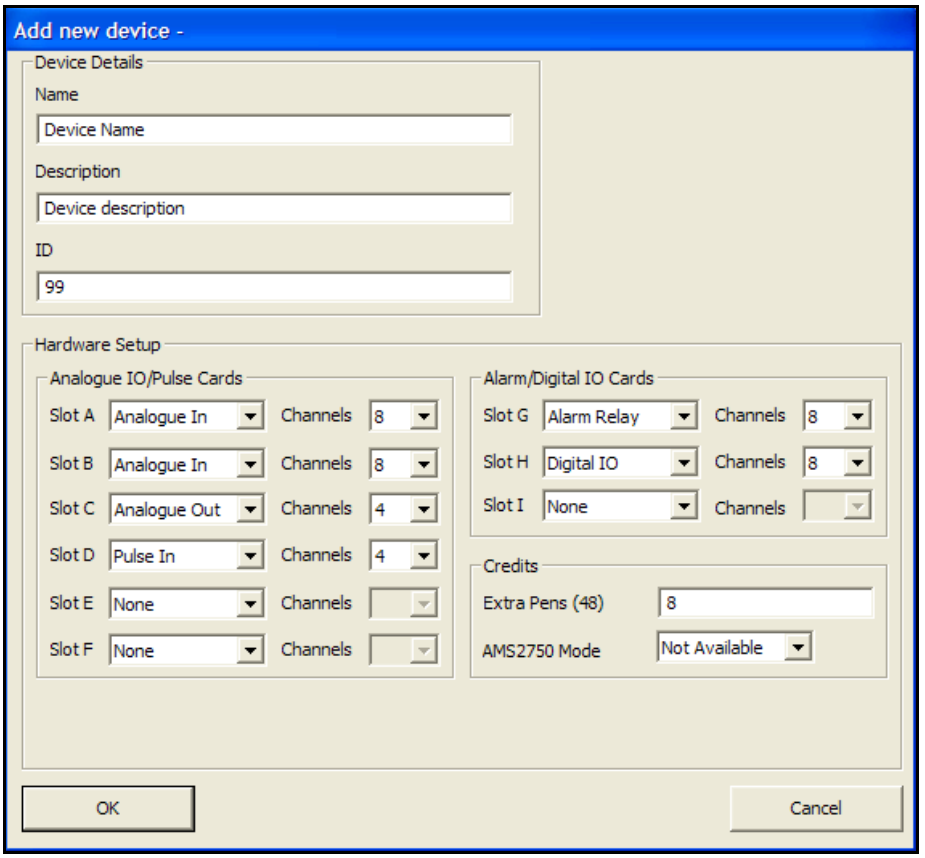
All areas are covered in the ***Trend Analysis Software*** **Help.** Click in any area on the screen and press F1 on the keyboard to display the related help files.

Recorder Setup

With the software open, the main screen will be blank with a tool bar down the left hand side. To start a new recorder configuration first select the ***Recorder button*** on the main button bar down the left side of the screen. An empty recorders pane will be displayed. Click on Add New Recorder.

Add New Device

Select ***Add New Device*** from the Recorders pane and select an **X Series and GR** device from the list of all types and press OK, the Add New Device box will appear. Enter the ***Device Name*** and ***Description*** in the boxes provided to identify the recorder setup. The ***ID*** number of the unit must be set by the user. If this setup is going to be transferred to a recorder enter the same ID number as the recorder. **It is important that all of the user's recorders have different ID numbers.**



An alternate method is to go to the recorder, save the setup on a media (even if it is blank), and import the setup to the ***Trend Analysis*** software. This way the hardware configuration, number of virtual pens, modbus number, and the serial and ID numbers are correct form the beginning. It also helps reduce setup time if the customer wants to do real-time communications.

NB. Add New Device functionality is not applicable for the Archived Databases from the Archive Database Server.

Hardware Setup

In the “Add new device” box there are slot references that co-ordinate with the slots on the rear panel of the recorder. Select the drop down list in each slot for ***Analogue IO/ Pulse*** In cards, this hardware-setup must match the recorder configuration. Select the correct card description for each slot and the channels number, if there is no card fitted Select None.
(Analogue Output and Pulse input cards are not available for the **QXe, GR1** recorder)

Alarm/Digital IO Card Setup

If fitted, select the type of ***Alarm/Digital IO*** cards that will match the recorder’s set up. Select the correct card description for each slot and the channel numbers, if there is no card fitted select None.

Recommended Card Positions

Table 6.1 : Card/Slot positions

SX, GR3		
Slot position	**Card type**	**Channel numbers**
Slot A	8 Analogue In Pulse Input	1 to 8 1 to 4
Slot B	8 Analogue In Pulse Input	9 to 16 9 to 12
Slot C	8 Analogue In Pulse Input	17 to 24 17 to 20
Slot D	8 Analogue In Pulse Input	25 to 32 25 to 28
Slot E	8 Analogue In Pulse Input 4 Analogue Out	33 to 40 33 to 36 33 to 36
Slot F	8 Analogue In Pulse Input 4 Analogue Out	41 to 48 41 to 44 41 to 44
Slot G	4 Relay Output 8 Relay/2 Digital In 8 Digital Input/Output 16 Digital Input/Output	1 to 4 1 to 8 1 to 8 1 to 16
Slot H	4 Relay Output 8 Relay/2 Digital In 8 Digital Input/Output 16 Digital Input/Output	17 to 20 17 to 24 17 to 24 17 to 32
Slot I	4 Relay Output 8 Relay/2 Digital In 8 Digital Input/Output 16 Digital Input/Output	33 to 36 33 to 40 33 to 40 33 to 48

QX, GR2		
Slot position	**Card type**	**Channel numbers**
Slot A	8 Analogue In Pulse Inputs	1 to 8 1 to 4
Slot B	8 Analogue In Pulse Inputs 4 Analogue Out	9 to 16 9 to 12 9 to 12
Slot G	4 Relay Output 8 Relay/2 Digital In 8 Digital Input/Output 16 Digital Input/Output	1 to 4 1 to 8 1 to 8 1 to 16

QXe, GR1		
Slot position	**Card type**	**Channel numbers**
Slot A	3 Analogue Inputs 6 Analogue Inputs	1 to 3 1 to 6
Slot B optional card	3 Analogue Inputs 6 Analogue Inputs	9 to 11 9 to 14
Slot G	4 Relay Output 8 Relay/2 Digital In 8 Digital Input/Output	1 to 4 1 to 8 1 to 8

To fit the Analogue Input option card (Slot B) or a Relay Alarm or Digital IO card into the **QXe, GR1** recorder you will require an expansion card to interface to the recorder.

Extra Pens

Extra Pens is an option that is available using the Firmware credit system in the recorder. Extra pens can be set up here to reflect the recorder setup. If a setup is going to be transferred to a recorder, ensure that the same amount of extra pens are available in the recorder. These extra pens are used mainly for displaying maths functions and the totaliser. Extra pens can also be used as Comms variable pens.

When the Hardware details have been entered click on the OK button. This will save the new recorder details and the Setup Window is displayed.

AMS2750 Mode

AMS2750 is an option that can be enabled in the credit system. AMS2750 is the specification that covers pyrometric requirements for thermal processing equipment used for heat treatment. **Trend Manager Suite** has 2 capability modes to match with the mode set in the recorder.

In process mode sets of timers are configured to inform and alert the user to the status of certain conditions, these include: Temperature Uniformity Survey (TUS), System Accuracy Tests, Instrument Calibradtion due date, Control TC due date and TC Status.

In TUS mode the recorder is configured to run a survey based on sensor and furnace settings in the recorder. These must be configured in line with AMS2750 specification.

Refer to the User manual for more details.

Setup Window

General Setup

This is a list of areas for configuration in the Setup Window.

General - *See "General button" on page 58*

Field IO - *See "Field IO" on page 65*

Pens - *See "Pens" on page 77*

Comms - *See "Comms" on page 86*

Event/Counters - *See "Events/Counters" on page 95*

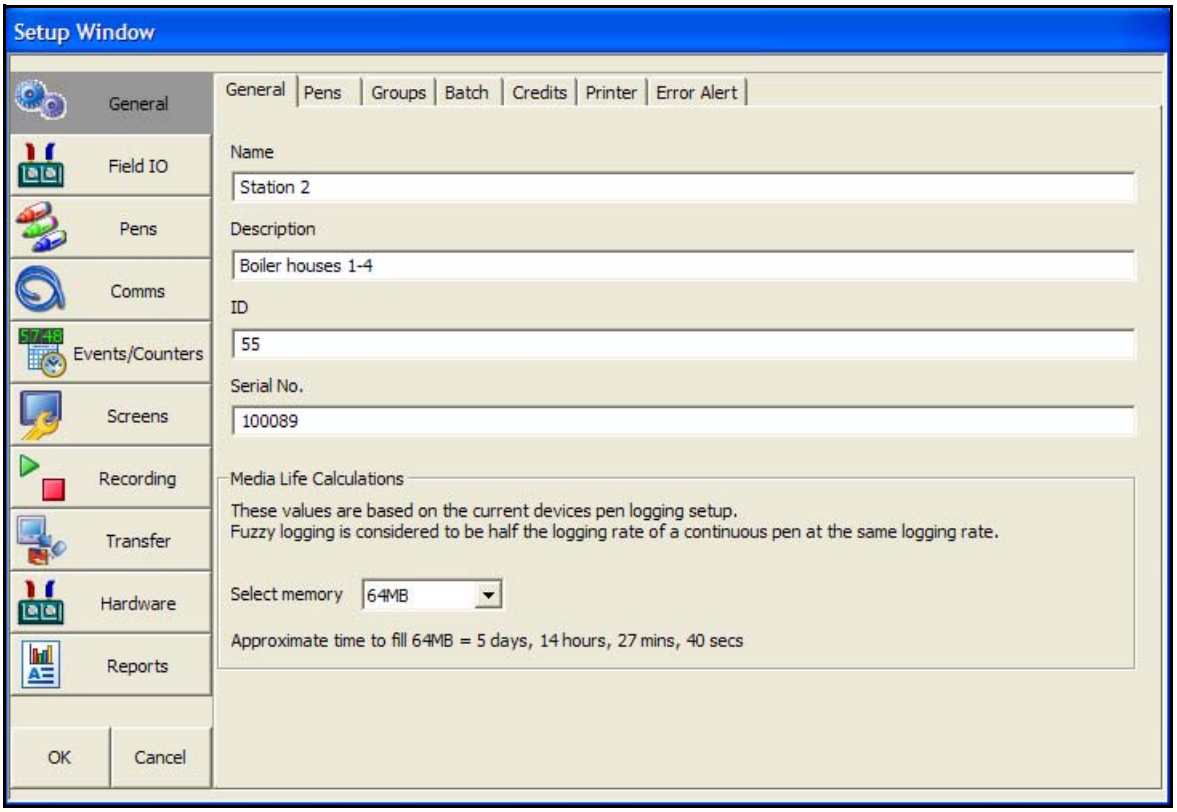
Screen - *See "Screen" on page 106*

Recording - *See "Recording tab" on page 108*

Transfer - *See "Transfer" on page 111*

Hardware - *See "Hardware" on page 112*

Reports - *See "Reports" on page 113*



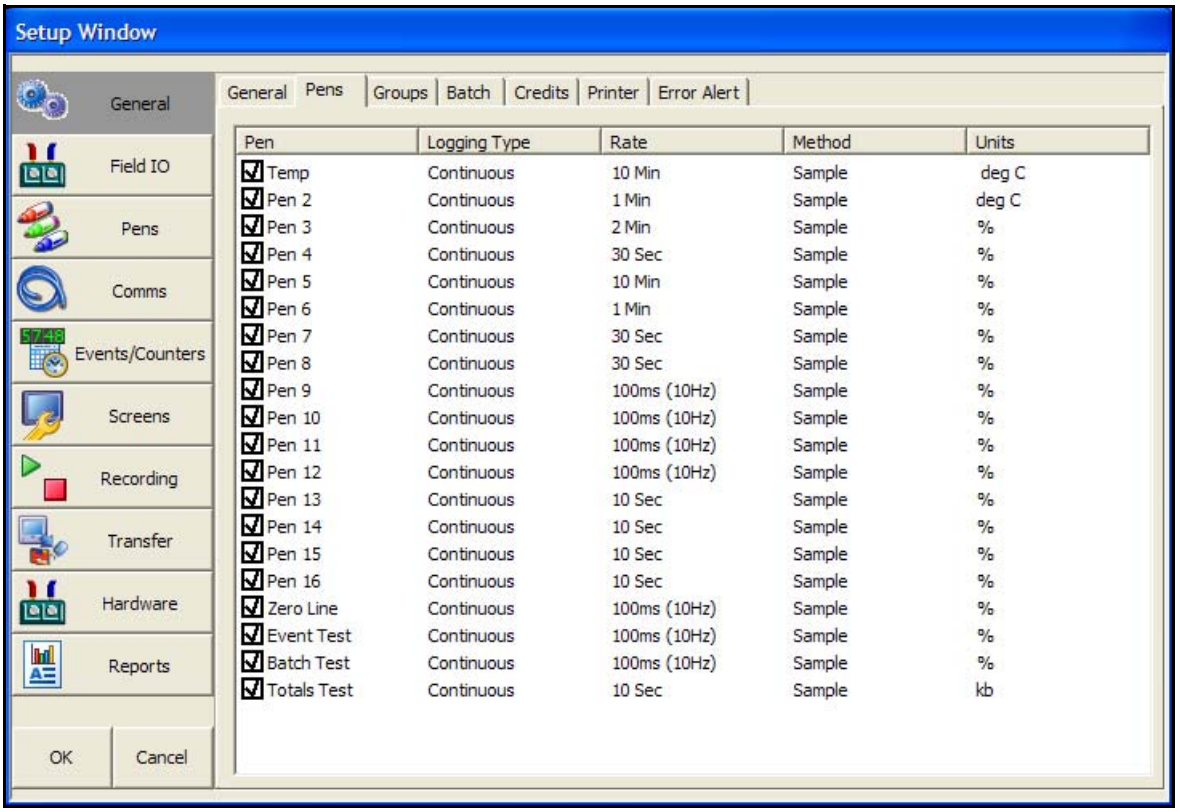
General button

The ***General*** button contains the following tabs:

- **General tab -** Check and edit the recorder information here. ***Name, Description, ID*** and ***Serial Number***. The ***Media Life Calculations*** will work out the amount of time it will take to fill the USB key, Compact Flash or SD card in the recorder. Select the size of the card and calculations will be based on the current set up eg. how many pens are logging.
- **Pens -** Displays information for each pen available in the recorder. Including which pens are enabled, logging type, rate, method and units of measure
- **Groups -** Displays groups of pens that can be renamed here
- **Batch** - Enable the batch information that is required before running a batch
- **Credits** - Displays all the Firmware options available in the recorder's credit system
- **Printer -** This tab is used to set up the printer configuration
- **Error Alert** - Setup and customise the Alert box information.

Pens tab

Displays the details of each available pen on the recorder. From left to right this screen shows if the pen is enabled, the ***Pen*** name, the ***Logging Type***, logging ***Rate***, logging ***Method*** and the ***Units*** of measure for each pen.


Setup Window
General
Field IO
Pens
Comms
Events/Counters
Screens
Recording
Transfer
Hardware
Reports
OK
Cancel
General
Pens
Groups
Batch
Credits
Printer
Error Alert
Pen | Logging Type | Rate | Method | Units
Temp | Continuous | 10 Min | Sample | deg C
Pen 2 | Continuous | 1 Min | Sample | deg C
Pen 3 | Continuous | 2 Min | Sample | %
Pen 4 | Continuous | 30 Sec | Sample | %
Pen 5 | Continuous | 10 Min | Sample | %
Pen 6 | Continuous | 1 Min | Sample | %
Pen 7 | Continuous | 30 Sec | Sample | %
Pen 8 | Continuous | 30 Sec | Sample | %
Pen 9 | Continuous | 100ms (10Hz) | Sample | %
Pen 10 | Continuous | 100ms (10Hz) | Sample | %
Pen 11 | Continuous | 100ms (10Hz) | Sample | %
Pen 12 | Continuous | 100ms (10Hz) | Sample | %
Pen 13 | Continuous | 10 Sec | Sample | %
Pen 14 | Continuous | 10 Sec | Sample | %
Pen 15 | Continuous | 10 Sec | Sample | %
Pen 16 | Continuous | 10 Sec | Sample | %
Zero Line | Continuous | 100ms (10Hz) | Sample | %
Event Test | Continuous | 100ms (10Hz) | Sample | %
Batch Test | Continuous | 100ms (10Hz) | Sample | %
Totals Test | Continuous | 10 Sec | Sample | kb

Groups tab

This menu is used for re-naming the groups. The same pen can only be associated in one group. To add a pen to a group see *“Pens” on page 77.*

You may want to create groups of pens in order to:

- Acknowledge Alarms by pen groups
- Reset Max/Min, Reset Max or Reset Min by pen groups
- Reset Counter Alarms by pen groups
- Start, Stop or Reset Totals by groups

Batch tab

Batch is a firmware option is a firmware option that needs to be activated in the recorder.

The Batch function allows the user to segment portions of data for further analysis. Setting up a batch requires information to identify and control batches of data. Batch data can also be paused, for viewing, and resumed. A batch can be aborted at any time, if so this will not register as a batch, a batch is only complete when it has been stopped.

This Batch menu is the setup menu where you can configure all the Batch and Group properties before starting a batch.

Concurrent Batch Mode

Batch mode allows concurrent batches, where each batch is associated with a group, so all pens within Group 1 will belong to the batch that is controlled by Group 1. Screens can now be set to display groups, in this mode only messages associated with that group (i.e. pens within that group, or batch messages for that group) will be shown on the chart.

Remember when you have set up your batch requirements you need to assign pens to the batch group.

General Batch Properties - General

- **Pause Chart@Finish** - Enable this if you require the chart to be paused at the end of the batch. The chart will restart when another batch is started for that group.
- **Start Log @ Start -** Enable this if you require logging to start when the batch starts.
- **Batch logging control –** Pen logging can be controlled by batch start and stop, the stop and start logging can be independently controlled so a batch could start the pens logging but choose not to stop them logging when the batch stops, or start logging independently of a batch but have all pens stop logging when a batch stops. Only pens within the group of the associated batch will be controlled.
- **Stop Log @ Finish -** Enable this if you require logging to stop when the batch ends. See Start Log @ Start for details.
- **Allow Direct Input -** Enable this to allow the Batch control properties (listed below) to be edited directly from the batch control screen. A barcode reader can be plugged into the front of the recorder and the barcodes scanned in directly.
- **Single Screen Batch (available for GR Series recorders only)** allows you to view and enter all the batch details on a single screen. If this is not selected the Batch Wizard will enable separate screens to enter the same information. The batch fields are: Batch Name, User Id, Lot Number, Description and Comment are available for viewing and entering details on a single page using the Single Screen batch enabled, if disabled a separate screen will be required for each field. The Lot number is unique for each batch on a recorder and user cannot modify the Lot number. The Lot number starts at 1 and increments by 1. This is irrespective of whether the user is using Batch Wizard or Single Screen Batch to enter the batch details. The user can also set the above fields except Lot Number from a set of predefined list. Groups must be set up, see *See “Pens” on page 77*.

NOTICE

List driven data fields – The next 5 fields are available for data entry associated with a batch. The names can be overridden to suite the end user application, all fields are now 69 character long with the exception of the User ID which is 32. A pre-defined list of up to 30 items can be configured to allow users to select input for these fields from a list rather than type them in every time. E.g. a user might have 8 different products running though the same process, these can be pre-configured so when starting a batch the user can pick from a list of products. The pre-defined lists have to be enabled in the individual group screen, eg. Show *** List.

A set of functions are available to retrieve the list index from within Maths, allowing state based processing during user selection. See *Table 13.7 on page 264.*

Properties

- **Name Props. -** Enter the name of the batch name and setup a list of additional names to appear as a pick list as a part of the Batch Control screen in the recorder.
- **User ID Props. -** Enable this to make this a requirement when starting a new batch. The User ID display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. If Passwords are active on the recorder then the User ID page will be skipped for user entry and the name of the person logged in through the password system will be automatically entered.
- **Field 1 Props. -** Defaults to Lot No. Enable this to make this a requirement when starting a new batch. The Lot number display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. The addition list names will not appear in a drop down list in the Batch Control screen unless you enable Show “n” List in the group properties menu. *See “General Batch Properties- Group #” on page 61.*
- **Field 2 Props. -** Defaults to Description. Enable this to make this a requirement when starting a new batch. The Description display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. The addition list names will not appear in a drop down list in the Batch Control screen unless you enable Show “n” List in the group properties menu. *See “General Batch Properties- Group #” on page 61.*
- **Field 3 Props. -** Defaults to Comment. Enable this to make this a requirement when starting a new batch. The Comment display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. The addition list names will not appear in a drop down list in the Batch Control screen unless you enable Show “n” List in the group properties menu. *See “General Batch Properties- Group #” on page 61.*

General Batch Properties- Group

Automated batch counters – Each group can maintain its own batch counter, this can be configured to start at any desired value and be incremented by any set amount. The batch counter can be included in the batch name which itself can contain additional information.

- **Auto Pop. Wizard -** When enabled this will automatically populate the Batch Control screen with the properties entered into that specific Group.
- **Auto Pop Name -** This is the name of the group that will have it's properties populate the Batch Control screen
- **Zero Pad Count -** This refers to the amount of zeros that will be added to the embedded batch counter. Eg. BATCH -2 -[[GC.000001]]. This has to have the same amount of digits to accommodate the largest number the counter will reach, which will be the Rollover value. If this is not enabled the leading zeros will not be shown.
- **Ctr. Start -** This refers to the number at which the batch counter will start.
- **Ctr. Increment -** This is how much the counter will increase or increment by.
- **Ctr. Rollover -** Enter the number at which you want the counter to reach before it starts again.
- **Show *name* List -** (only appears when Auto Pop Wizard is off). Enable this to allow any additional list item names to appear in a drop down list in the Batch Control screen. *See below.
- **Show *id* List -** Enable this to allow any addition list item id's to appear in a drop down list in the Batch Control screen. *See below.
- **Show *Field 1* List -** Enable this to allow any addition list item for Field 1 to appear in a drop down list in the Batch Control screen. *See below.
- **Show *Field 2*List -** Enable this to allow any addition list item for Field 2 to appear in a drop down list in the Batch Control screen. *See below.
- **Show *Field 3* List -** Enable this to allow any addition list item for Field 3 to appear in a drop down list in the Batch Control screen. *See below.

*Additional list items are entered in *"General Batch Properties - General" on page 59*. Ensure you have the pens you require assigned to a group, see *"Pens tab" on page 58*.

At the bottom of the screen is the Ctr. Reset button, this will produce a warning dialog asking if you want to reset group # counters.

When the configuration is complete select the Finish button to Commit, Discard or Commit Later. Select the Back button to return to the previous menu.

Batch mode state and count in scripts, see *"Maths Variable and Function Tables" on page 264*.

Batch mode state and count in embedded variables, *Table 6.6 on page 101.*

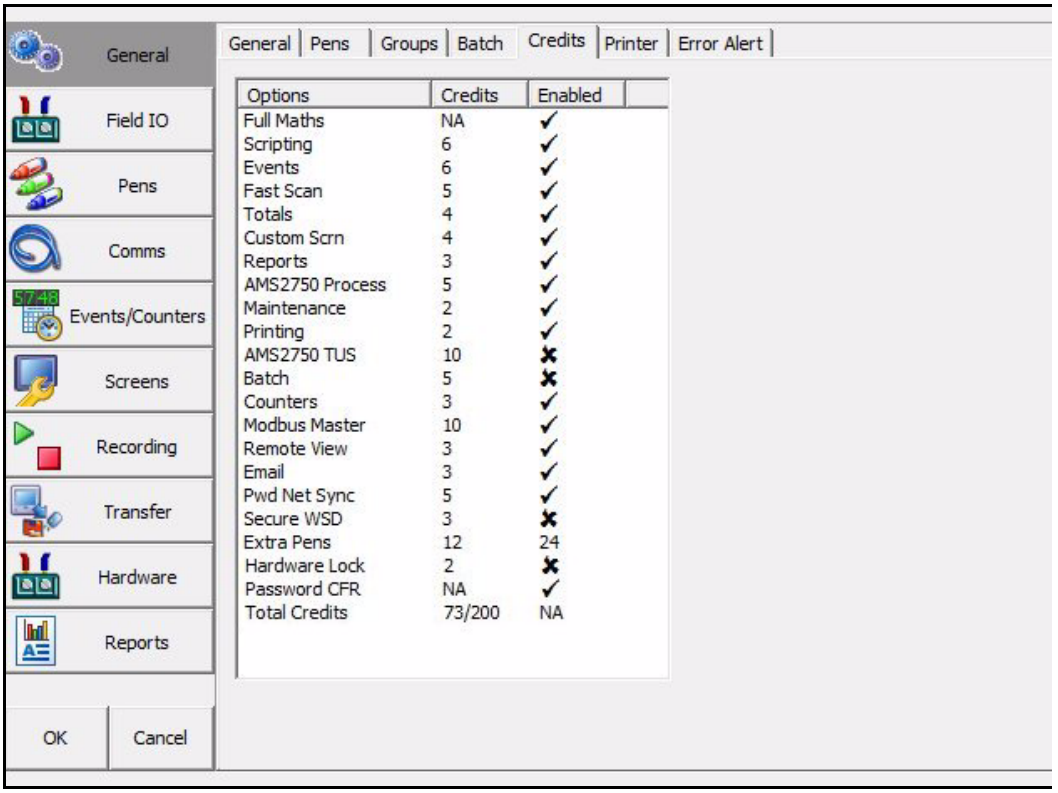
Note: batch mode no longer operates on pens that do not belong in a group, so when upgrading to the new version existing users need to add pens to a group to use the batch functionality

Credits tab

Displays a list of available firmware options. All options are shown as enabled for a new recorder setup. When this set up is sent to the recorder only the firmware options enabled on the recorder will be active.

You cannot add or remove firmware credit options in ***Trend Analysis software***.

When importing a setup from a recorder this screen will display the firmware credit options that are active in the recorder.



Notes

Password CFR - (ESS - Extended Security System). This will only appear in the list on the recorder if this feature is enabled in the recorder. It cannot be enabled by the firmware credit system - contact your supplier for details.

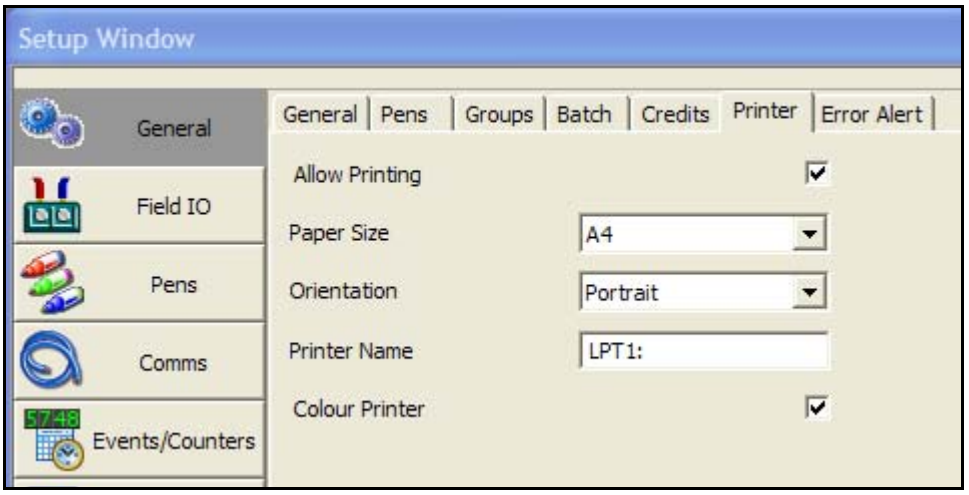
Scripting, Fast Scanning and Custom Screens are not available for the **QXe, GR1**.

Printer tab

The ***Printer*** function is a firmware option that is selectable from the ***Factory*** menu in the recorder. The screens on the recorder that currently can be printed are all Status screens, Message lists, Process screens and Replay screens.

The printer network information should be entered prior to printing, see *"Network Admin tab" on page 94.* If the information is not entered in the ***Network Admin*** menu a dialog box will appear prompting you to enter Username, Password and Domain. Entering this information into the dialog will not populate the Network Admin menu. It is recommended that you fill in this information into the Network Admin menu as it will not be affected by firmware upgrades in the recorder.

The Printer menu allows configuration for setting up a printer. The printer option displays a Print button from various screens using a basic USB standard PCL printer. For details on suitable printer types refer to the installation section of the User manual.



- **Allow Printing** - Tick to enable ***On*** and ***Off***
- **Paper Size -** Toggles between ***A4*** and ***Letter***
- **Orientation -** Toggles between ***Landscape*** and ***Portrait***
- **Printer Name -** Enter the printer name as found on the network. For a local printer that is connected directly to the recorder via USB, ensure the printer name is set to the default (LPT1:). Shared printers on a domain or work group require the network path to be entered in the Printer name. The file path will contain the server name (this could be the PC the printer is connected to or a print server) and the printer name.
  Eg. \\PC or print server name\printername
- **Colour Printer -** Tick if a colour printer is being used for the screen capture facility. Screen captures can be printed as an Effect of an Event. *See "Events - Cause and Effect" on page 96.*

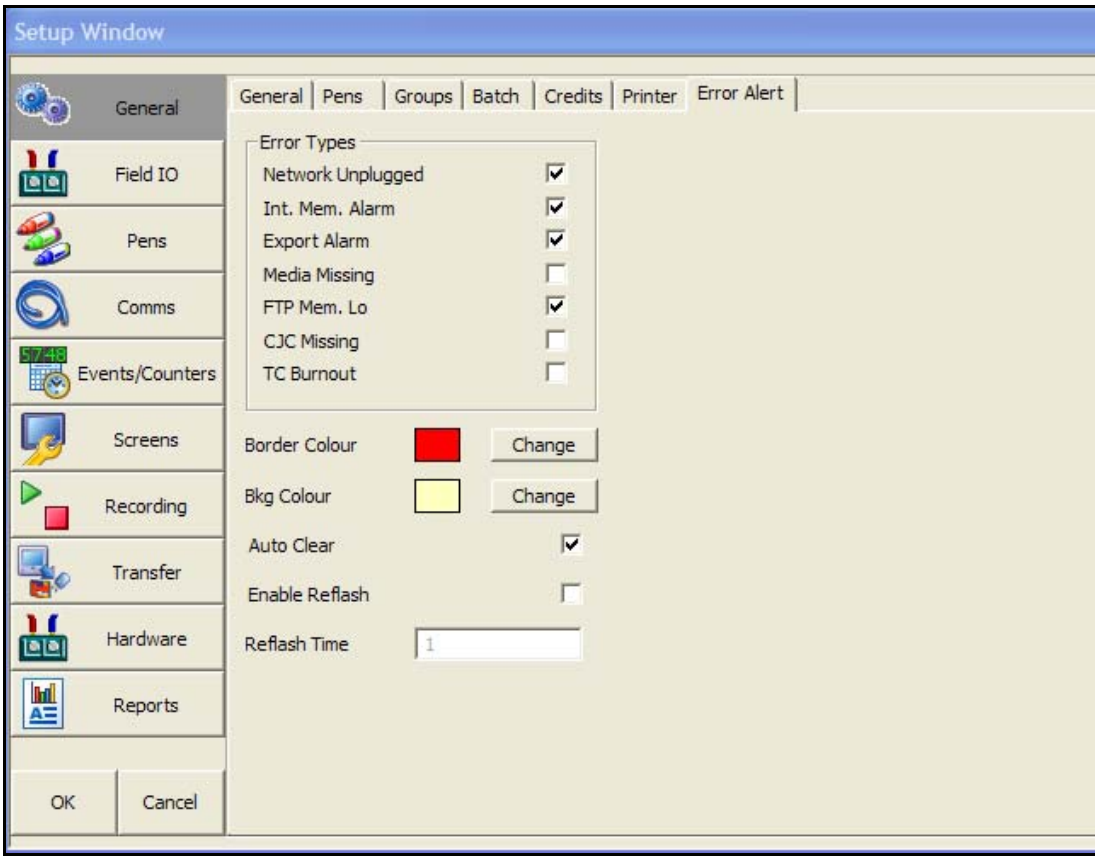
If in doubt, contact your IT Administrator for advice.

Error Alert tab

A new alert system has been implemented to allow on screen alerts to be displayed for serious errors and for early warning on potentially serious issues like available media space. When an alert is detected a large message box will be displayed on the screen, it has a flashing border for which colours are user defined and will display the current error state. An acknowledge button is available and a re-flash can be set to warn the user again if the error condition is not rectified.

- **Error Types -** The following conditions are available to be enabled:
  - ***Network Unplugged*** *(will detect hub/switch failure also)*
  - ***Internal Memory Alarm –*** *Display when internal memory is going to start overwriting non-exported data within a defined period of time. Storage Alarm level must be set.*
  - ***Export Alarm –*** *Where external media capacity will run out within a defined period of time. Storage Alarm level must be set.*
  - ***Media Missing –*** *External media is missing so a scheduled export is not possible.*
  - ***FTP Memory Low -*** *Display when internal memory is going to start overwriting non-FTP'd data within a defined period of time. Storage Alarm level must be set.*
  - ***CJC Missing –*** *CJC Sensor is not plugged into AI Card.*
  - ***TC Burnout -*** *A TC burnout has been detected.*

Storage Alarm Levels need to be set as to when the system is alerted that the three different memory areas as low. See *"Storage Alarm" on page 109*



- **Border Colour** - Use the on-screen colour palette to change the message border colour.
- **Background Colour -** Use the on-screen colour palette to change the message background colour.
- **Auto Clear -** When Auto clear is switched on the recorder will automatically detect if something has been done to rectify the problem and the message will disappear. Eg. if the removable external storage media being used for a scheduled export is full and is replaced with media that has sufficient memory available then the error alert box will disappear. If Auto Clear is switched off you will be required to press OK on the screen error alert message
- **Enable Reflash -** If Reflash is enabled and a time set the error alert message will appear again at the time specified until the error is resolved. With Reflash enabled pressing the OK button on the recorder's screen message will only make the message disappear until the next reflash time occurs.
- **Reflash Time -** Set this to how often you want the error alert message to repeat until the problem is solved.

Display alert as an event effect

This feature is available from within the event system where the Alert Display can be used as an event effect to display a preset or user defined marker. *See "Event Effects" on page 100.*

Field IO

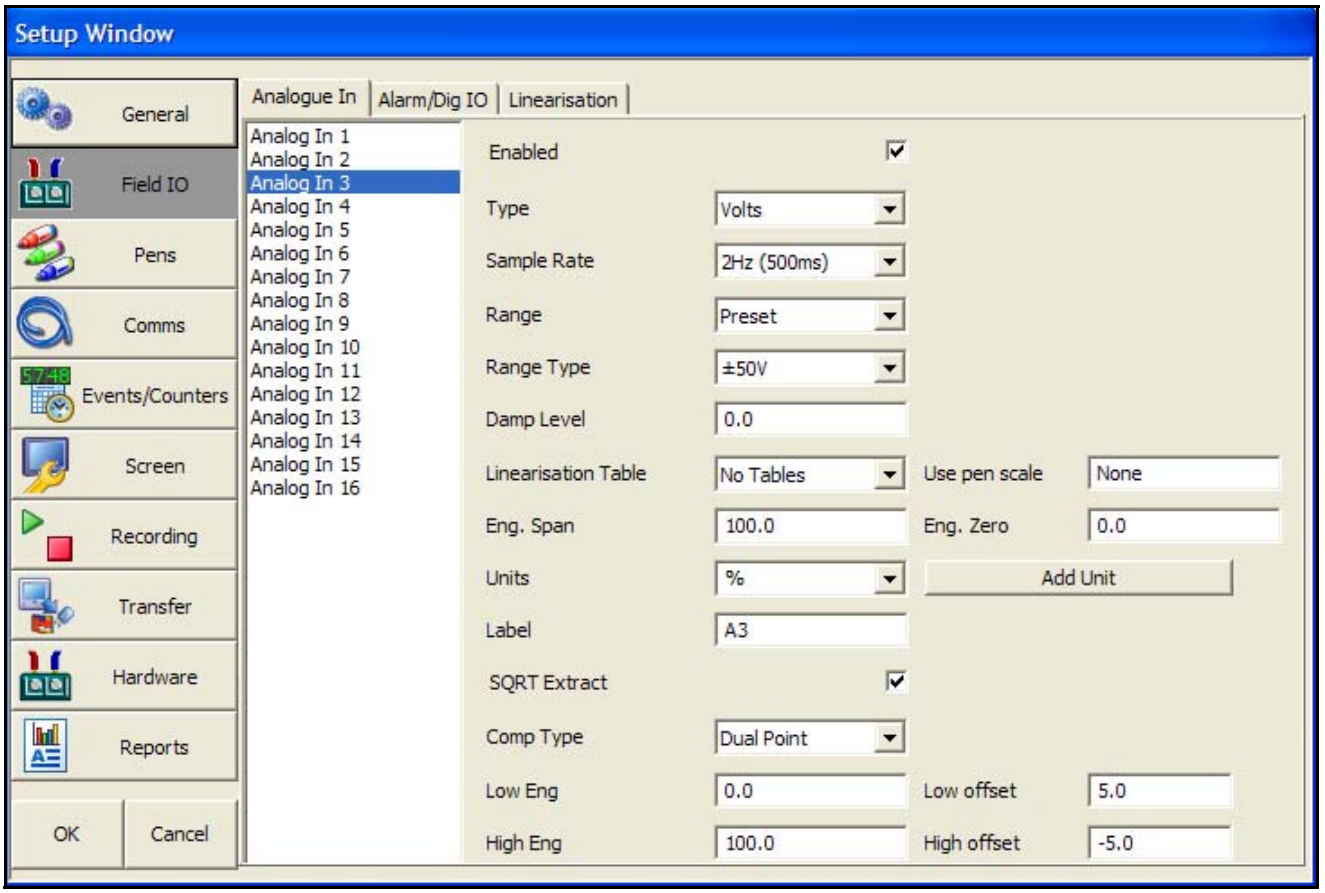
When AMS2750 mode is enabled extra tabs will appear for added configuration. Listed under the Analogue Inputs tab will be displayed Sensors" (only certain selections will be available).

Analogue In tab

Press the Analogues button to display all the analogue inputs available.

Click on the individual Analogue In number to set up each channel profile. Each channel has a list of menu items to be configured.

- **Enabled -** Tick to Enable.
- **Type -** Select this for a list of available signal inputs:Volts, Amps and Ohms RT (Resistance thermometer or TC (Thermocouple).
- **Sample Rate -** Select this for a list of available Analogue Input sample speeds. A Fast Scanning range of 50Hz (20mS) is available as a firmware option (not available on the **QXe, GR1**). Refer to *"Credits tab" on page 62* for Firmware options.
- **Range** (Ohms, Volts and Amps only) **-** Toggle between Preset and User Defined. The Preset option will make available a list of Range Types or select User Defined to specify High and Lower Limits.
- **Range Type** (Ohms, Volts and Amps only) - Only available when Range is set to Preset. Select for a list of available ranges. The factory default range is +/-12V.
- **Damp Level** (Ohms, Volts and Amps only) **-** Damping filters for noise reduction to smooth any significant or sudden change in the signal. Damping looks at the previous and current readings, executes an algorithm depending on how large the difference is between the two readings and then calculates a new position immediately. Damping is only enabled when a thermocouple or RT is selected. Enter the Damp level in Engineering Units.



- **Linearisation Tables** (Ohms, Volts and Amps only) - Select a table from the drop down list if required. *See "Linearisation tab" on page 71.*

- **Use Pen Scale -** Toggle On and Off, this is enabled by default. Analogue # defaults to the corresponding Pen #, eg. A1 will default to Pen 1. If you change A1 to use another pen scale eg.Pen 3, you must go into Pen 3 and change the maths to A1. This will ensure that Pen Scale 3 will display A1 input. With this enabled the Engineering Zero and Span is the same as the pen scale. Disable this and the Engineering Zero and Span will not reflect the pen scale. This is not available when using Linearisation Tables.

- **Units -** This is the Units of Measurement for each input. Select and enter a value. Max 13 characters.

- **Label -** Select and enter an identification label for the input. Select and enter a label. Max 15 characters.

- **SQRT Extract -** Toggle On and Off. The Square root extraction in the analogue input is used to linearise certain sensors that have a non linear output - for example in the calculation of flow. So when you check the Square root extraction in the Analogue input section it carries out the following calculation. It ratios the analogue input range that you set, to 0 to 1. So any sensor input is represented by a number from 0 to 1. We then take the square root. We then re ratio the result back to the user set range.

- **Comp Type* -** select from None, Single Point or Dual Point compensation.
  Sensor Compensation may be required to improve accuracy on a sub range. This is an adjustment to the value of the signal input on each channel, based on the Engineering units settings.

Single Point
Set the Comp Type to Single Point to adjust the signal input reading by an offset amount determined by the user. Enter the Eng Offset adjustment required and this is added or subtracted for all future readings.
Dual Point
Select Dual Point to change two points on the signal input reading. The Dual Point adjustment works in the same way but at two different points on the signal input. The two points must be more than 50%, of the engineering units, away from each other.

- **Low Eng -** Set the low limit for the engineering units.
- **Low Offset -** enter an offset value that is offset against the low eng value.
- **High Eng -** Set the high limit for the engineering units.
- **High Offset -** enter an offset value that is offset against the high eng value.

- **High Limit** - Available when Range Type is set to User Defined. Select and enter the high limit value.
- **Lower Limit** - Available when Range Type is set to User Defined. Select and enter the lower limit value.
- **RT Type -** Only available when Type is set to RT (Resistance Thermometer). Select this for a list of available RT types.
- **Burnout Type -** Only available when Type is set to TC (Thermocouple). Toggle between Active and Passive. Active means it will send out a current to the TC. Set to Passive means it takes a reading without sending out a current. The T/C is wired differently for Active and Passive Burnout.
- **Show Burnout -** Only available when Type is set to TC. Toggle between Upscale and Downscale Burnout.
- **TC Type -** Only available when Type is set to TC. Select this for a list of available TC types.
- **CJ Comp -** Only available when Type is set to TC. Select this for a list of available CJ Compensation.
  - **Int Automatic -** Uses the cold junction sensor in the recorder as a variable reference temperature
  - **Ext 0 Deg C -** Assumes the cold junction is held at 0°C to provide a 0mV reference, external to the recorder
  - **Ext with Spec Temp -** Uses a reference junction held at a constant temperature. Specify the temperature that the cold junction sensor id to be set at.
  - **Ext Input -** Use a thermocouple or resistance thermometer from another channel to measure the cold junction sensor
- **External Input -** Only available when CJ Compensation is set to Ext Input. Select the input required as an external input.
- **Eng. Span -** (Ohms, Volts and Amps only). Only available when ***not*** using “Use Pen Scale” option. This is the highest value of the engineering range and corresponds to the top of the input range. Select and enter a value using the on-screen keyboard.
- **Eng. Zero -** (Ohms, Volts and Amps only). Only available when ***not*** using “Use Pen Scale” option. This is the bottom of the engineering scale and represents the bottom of the input scale. Select and enter a value using the on-screen keyboard.

Analogue Out tab

Only available when a Analogue Output card is a part of the Setup. Press the Analogue Out button to display all the analogue outputs available. Click on individual Analogue Out number to set up each channel profile. Not available on the **QXe, GR1**

- **Enabled -** Tick to enable.
- **Overrange -** Tick to enable, enabled as default. This will allow the output signal to go overrange to 21mA, if disabled the maximum is 20mA.
- **Transmit -** Select a pen to output 4-20mA loop. This will take the scale value from the pen it is transmitting and convert to 4-20mA output signal. eg if the scale is 0-50% this signal will fit the scale so 4mA = 0% and 20mA =50%.
- **Output -** Select either 4-20mA or 0-20mA.
- **Label -** Select and enter an identification label. Select and use the on-screen keyboard. Up to 16 characters.

Pulse In tab

Only available when a Pulse Input card is part of the Setup. The Pulse Input card operates up to a frequency of 25kHz max. Not available on the **QXe, GR1**

If a Pulse input card is fitted the first 4 pens will display the maths function of HPULn in the Maths tab in the Pens section as default to display the pulse reading.

Click on individual Pulse Input number to set up each channel profile.

- **Enabled -** Tick to Enable.
- **Update Rate** - Fixed at 1Hz

Label - Select and enter an identification label for the pulse input. Select and enter a label. Up to 16 characters.

Alarm/Digital IO tab

The Alarm/Digital IO button will display all the digital inputs/outputs available. Click on each individual Alarm IO or Digital IO number to set up each channel profile.

2 types of Alarm Relay cards: 4 Alarm Relay Output card and an 8 Alarm Relay Output with 2 Digital Inputs card.

2 types of Digital IO cards: 8 Digital Inputs or Outputs card and a 16 Digital Inputs or Outputs card. (Not available for the **QXe, GR1** recorder)

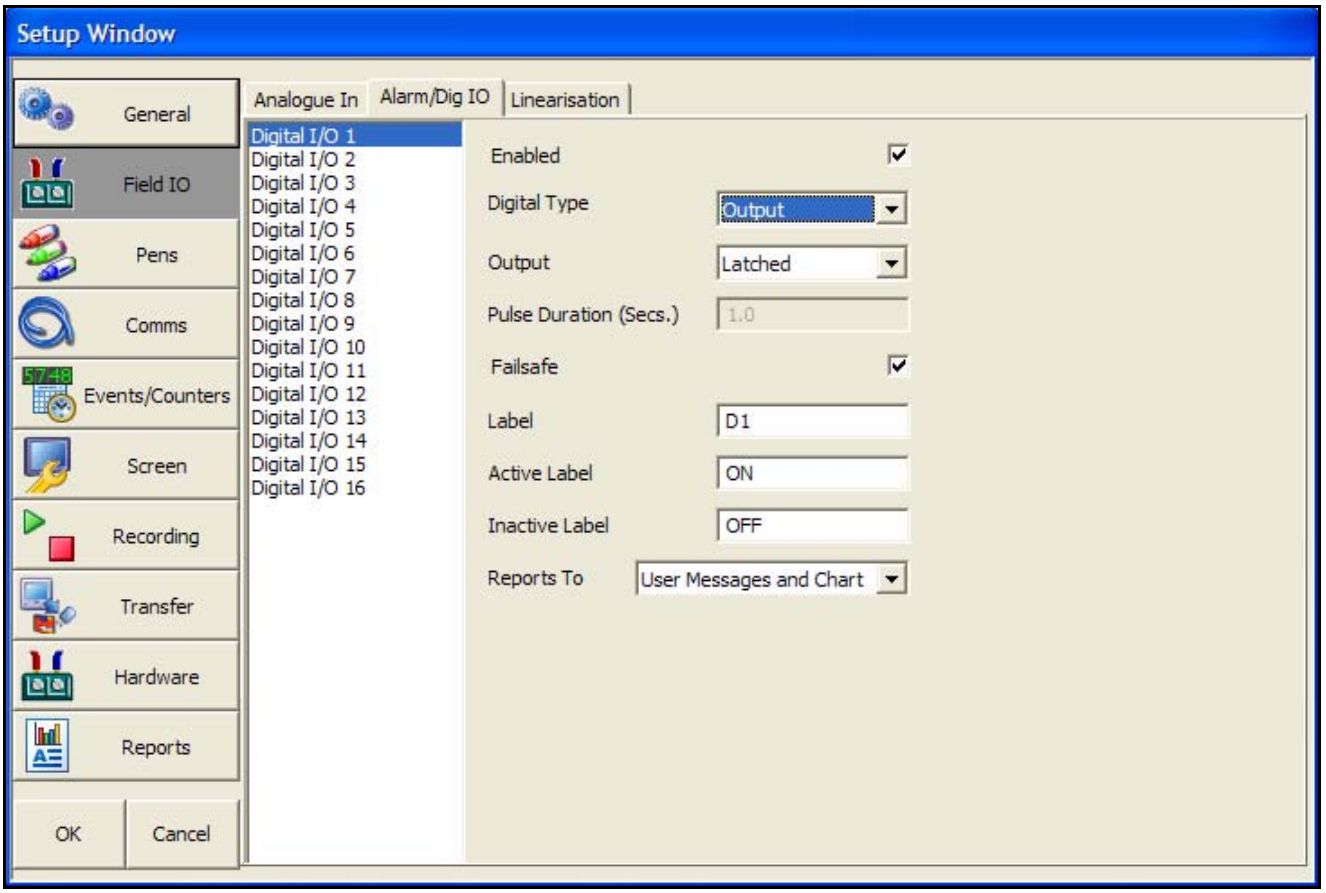
Alarm Relay Card

4 Alarm relay output card or 8 Alarm relay Output with 2 Digital Inputs (6 fixed outputs and 2 configurable Digital Input or output) cards.

Digital IO Card

There are 8 or 16 Digital channels per card that can be setup as inputs or outputs. The Digital I/O card also has 4 channels that can be set as pulse inputs (channels 1 to 4). The operating frequency for pulse inputs on the Digital I/O card is 1kHz max.

To view and log a channel selected as a Pulse input, set up an extra pen with a Maths function of LPULn in Edit Maths in the Pens menu.



For all cards select each Alarm/Digital # to display the configuration. Each channel has a list of items to be configured.

- **Enabled -** Tick to enable.
- **Digital Type -** This is set to Output Relay contact (Power) for the Alarm Relay cards. Toggle between Input and Output or Pulse Input for the Digital IO card. On the 4 Relay Alarm card, only output type is available. Channels 1 to 6 on the 8 Alarm Relay card are outputs, channels 7 & 8 can be either inputs or outputs.
  Note: Pulse Input only available on channels 1 to 4 for slot G, 14 to 20 for slot H and 33 to 36 for slot I.
- **Output -** (Output only). The relay outputs can be set to be either Latched or Single Pulse. A Latched relay will be maintained in its active state until the trigger source has returned to a non-alarm state. For Single Pulse the relay will go active for a period of time, specified by the user, then return to a non active state. The time out period remains independent of the length of time the active state remains. If the output is set to Single Pulse, when the alarm is activated the signal will display a single pulse for the duration set. See Pulse Duration. The alarm will trigger again when it goes into an active alarm state.

NOTICE

Outputs that are set to Single Pulse should not be used as a part of a maths expression as it can cause spurious values.

- **Pulse Duration -** (Output only). Available when Single Pulse is selected. Specify the pulse length in seconds from 0.1 (100ms) to 6480 (108 minutes) in 0.1 second increments. Select and enter the pulse length.

- **Fail Safe-** (Output only). Tick to enable. Each relay channel can be independently selected with the fail safe option. This will invert the state of the relay output. With Fail Safe Off, normally open (NO) relays have open contacts when the power is off, and open contacts when there is no active alarm. The contacts will close when an associated alarm goes active. With Fail Safe On, normally open relays have closed contacts when the recorder is powered on and there are no open active alarms, and the contacts open with an alarm active or when the power is removed..

Table 6.2 : Fail Safe Relay positions

QXe, QX and SX Relay Positions (no alarms active)			
Normal Relay Output States		**NO**	**NC**
	Power On	Open	Closed
	Power Off	Open	Closed
Failsafe Relay Output States		**NO**	**NC**
	Power On	Closed	Open
	Power Off	Open	Closed

- **Label -** Select and enter an identification label. Select and enter a label. Up to 16 characters.

- **Active Label -** (Input and Output only). This is the label that is shown when an alarm becomes active. Select and enter a label. Not available for Pulse Input. Up to 12 characters.

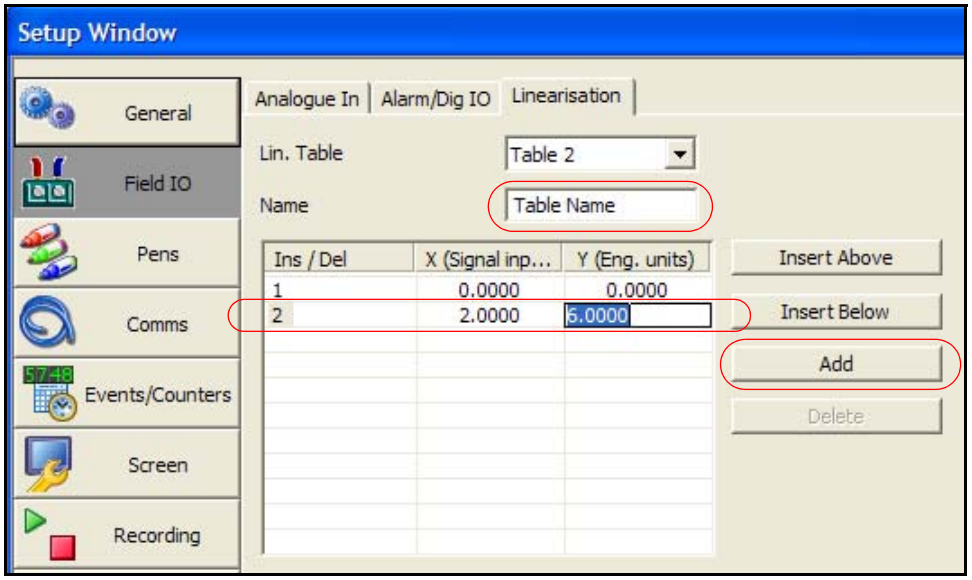
- **Inactive Label -** (Input and Output only). This is the label that is shown when an alarm becomes inactive. Select and enter a label. Not available for Pulse Input. Up to 12 characters.

- **Reports To -** This will acknowledge the Alarm/Digital IO to a selected destination. Select User message to add the Digital IO occurrence to the messages list only. Select Mark On Chart to display the occurrence on a chart and to the messages list.

Linearisation tab

The Linearisation tab can be located as part of the Analogue In setup.

Linearisation Tables - To be used with Analogue Input type Volts, Amps or Ohms.
These are user defined tables that can be set up to allow a non-linear input signal to be displayed on the recorder. By entering a set of non-linear signal input values (X) into the linearisation table, the recorder will use the table to generate linear output (Y) in engineering units, to be displayed and/or log on the recorder.



- Select the next available table and rename it for ease of identification.
- Click on the Add button to insert the first line
- Click into the text entry boxes under the X and Y boxes and enter the required values (or leave if your table starts at 0). The Signal Input (X) goes in the first column and the Engineering units (Y) in the second column.
- To add more lines, click on a line and use the Insert Above and Insert Below buttons. To add a line at the bottom, click on Add. To delete a line, click in the line and select Delete. When you have finished your table it will be saved automatically.

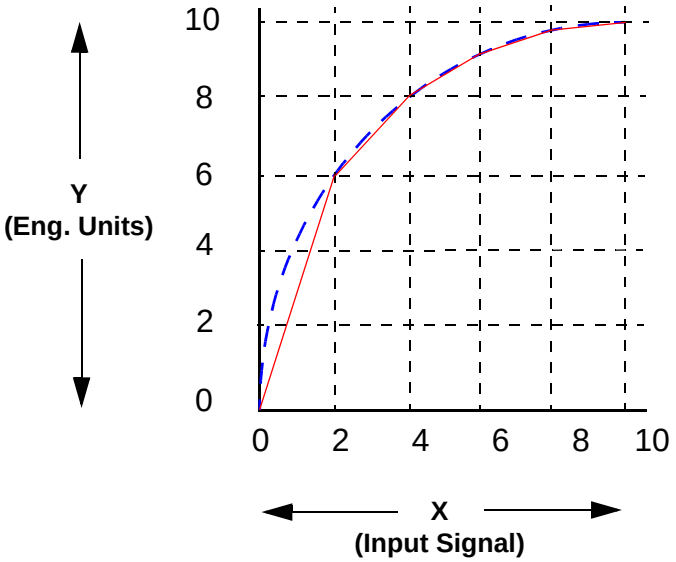
Data Error box

If there is a mistake in the table a Data Error box will appear saying “Data line * is invalid”. This will appear when you select another table or another function. The error box will indicate which line has the error. There may be more than one error in the table, if so the data error message box will appear for each error starting from the top line down going to the next as each error is fixed.

Linearisation Table examples

Figure 6.1 shows an example of a set of non linear signal inputs (X) and the required values in engineering units (Y) that have been entered into a linearisation table. They would produce the following curve.

Figure 6.1 Example of a 0-10V non-linear input signal

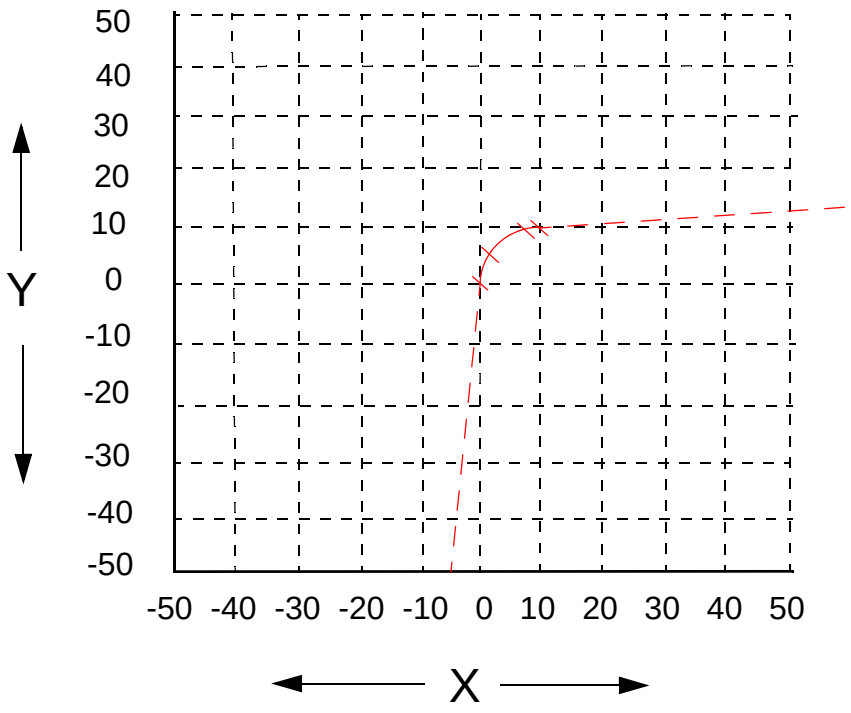


A straight line is drawn between each point, as shown by the continuous (red) line in *Figure 6.1*. For a more accurate curve, as shown by the dotted line (blue), add more data points into the linearisation table.

If the full input range is greater than the range used in the linearisation tables then the signal will carry on following the slope of the last two inputs. For example if we had a -50 to +50V range and just used the 0 to 10V linearisation table then the signal would look like *Figure 6.2*.

Figure 6.2 Linearisation table used for part of the range

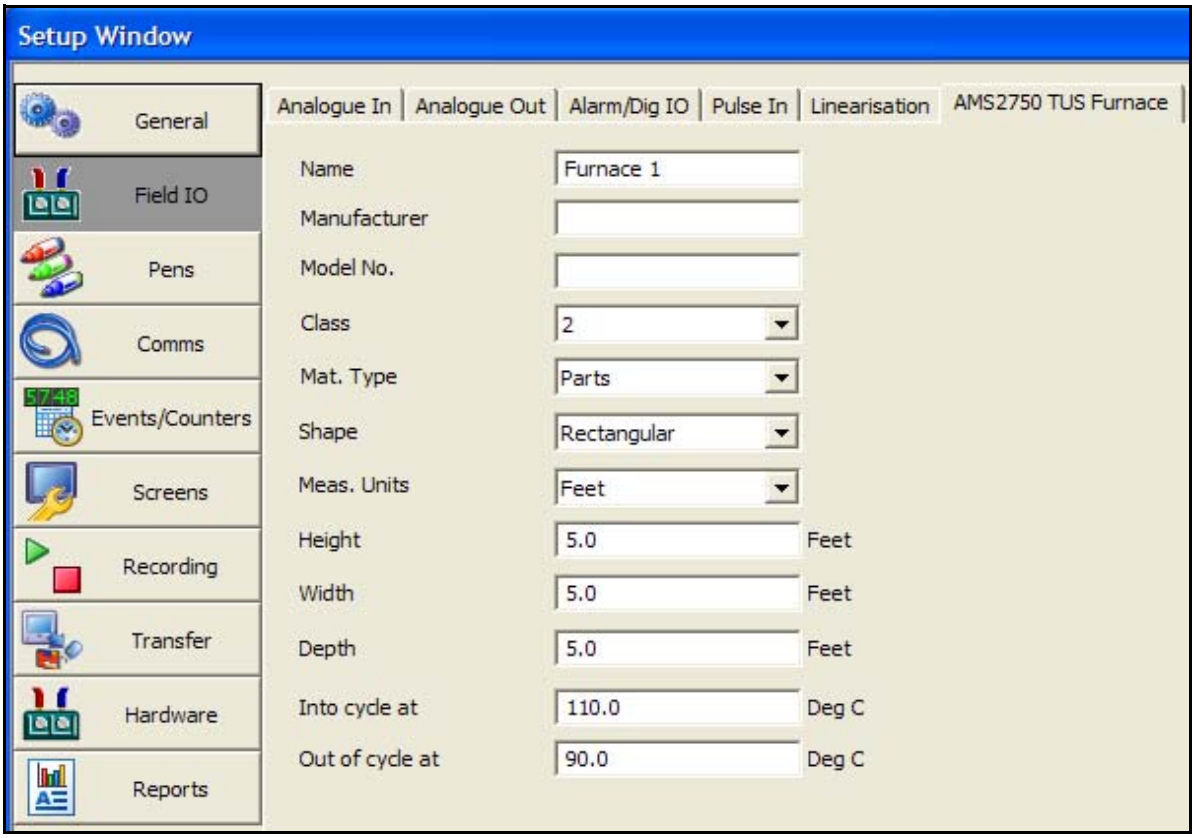
The last two points are used to follow the slope for the rest of the signal.
At the bottom of the 0-10V table the last two inputs are X=0, Y=0 and X=2, Y=6. At the top of the 0-10V table the last two points are X=8, Y=9.8 and X=10, Y=10. *Figure 6.2* shows these last two inputs at the top and bottom of the 0-10V signal.



AMS2750 Furnace (Process and TUS)

Up to 6 furnaces or ovens can be configured and fed into one recorder. Furnaces 1 to 6 relate directly to Groups 1 to 6 configured in the recorder. Select each furnace in turn and configure as required.

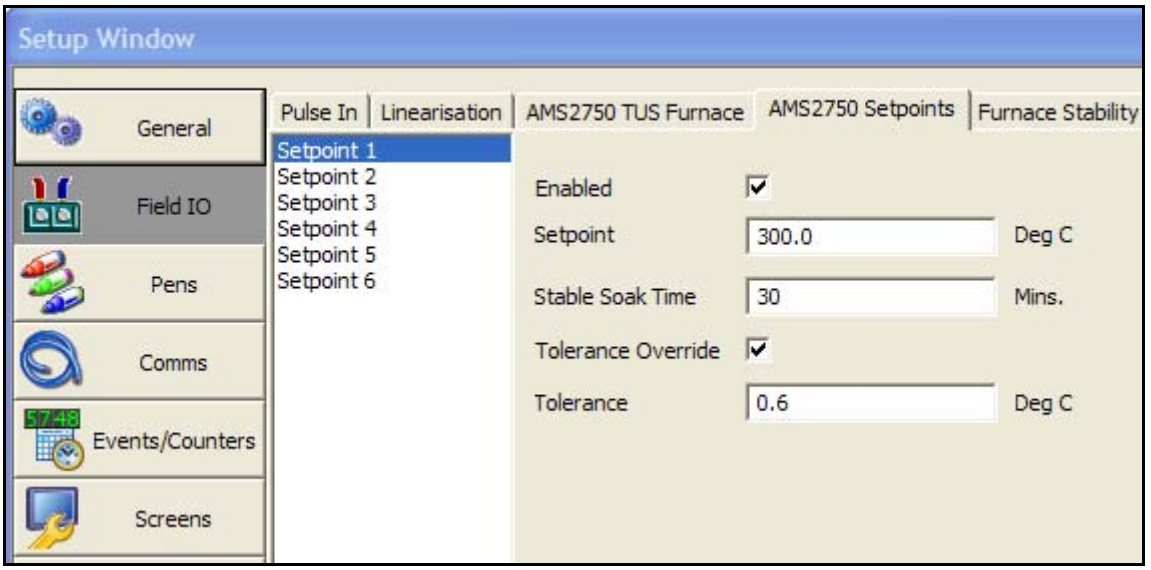
For Process Furnace set up and TUS Furnace set up the screens are similar, with a few additions to the TUS Furnace, see below.



- **Name** - Name or tag used to identify this furnace. 40 characters of Alphanumeric.
- **Manufacturer** - Enter the manufacturer of the furnace.
- **Model No.** - Unique Model or Serial number of this furnace. 20 characters Alphanumeric
- **Class** - Enter the Furnace class, 1 to 6 numeric
- **Mat. Type** - Enter the type of material or load, Parts or Raw material furnace
- **Shape -** Furnace shape, rectangular, cylindrical or other (TUS mode only)
- **Meas. Units -** Furnace measurement units,Metres and millimetres or feet and inches. (TUS mode only)
- **Height, Width, Depth -** Furnace dimensions dependent on shape (TUS mode only)
  Note. these are the dimensions for the qualified working area
- **Inst. Type** - (A to E) Refer to AMS2750. (Process mode only)
- **Into cycle at** - used to define a temperature cycle for a certain number of uses. When the furnace has reached the high temperature set here and then falls below the Low temperature set in the menu below, this is a complete temperature cycle. Eg. Into cycle is set to 110 (can go higher) in use, once it drops back to the Out of cycle set eg. Out of cycle is set to 90, the cycle is complete.
- **Out of cycle at** - Set Out of cycle as explained above in Into Cycle.

AMS2750 Setpoint (TUS mode)

The configured setpoint or soak level, this is the level configured for each thermocouple configuration as per AMS2750. Up to 6 setpoints can be configured individually as a part of a single survey. The set-points must be done in an increasingly progressive order.



Select a Setpoint

- **Enabled** - Default is off. Check to enable.
- **Setpoint** - Enter the survey setpoint value as a temperature.
- **Stable Soak Time** - soak time for the actual survey period. Per AMS2750, the minimum survey soak time is 30 minutes.
- **Tolerance Override** - Check to enable. This will become the working tolerance for the soak in the TUS as opposed to the tolerance for the class.
- **Tolerance** - set a tolerance override temp value.

AMS2750 Furnace Stability Detection (TUS mode)

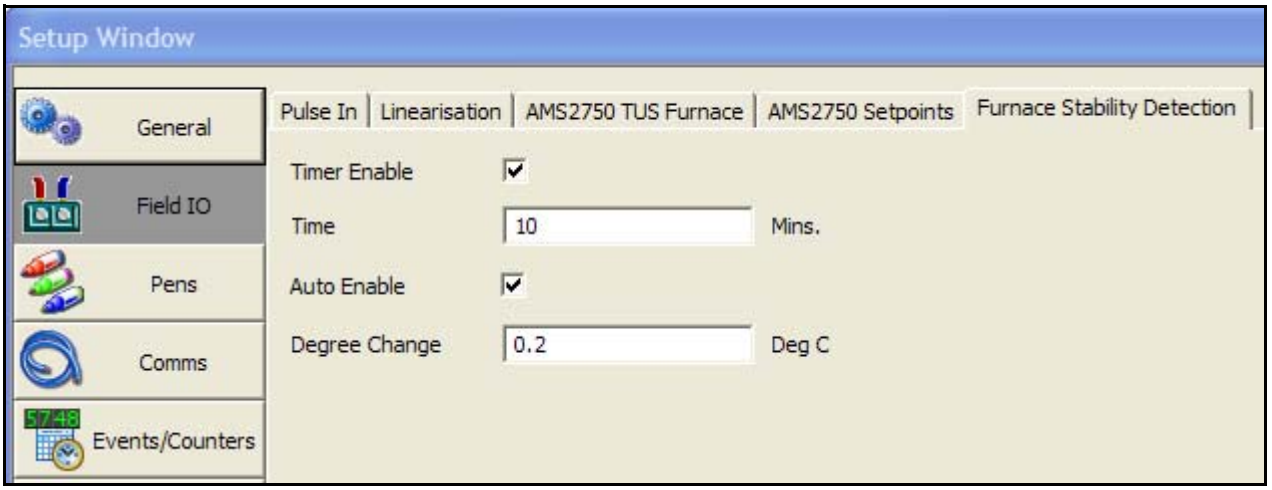
During the TUS the recorder starts to monitor all sensors for stability, all sensors must remain stable for a minimum of 2 minutes in order to progress to “in soak, in stability” mode. no TC’s can drift by more than “X” degrees within a 2 minute period for stability to be achieved” (X defaults to 0.5 Dec C). Refer to the User manual for more details.

This time is determined by how you set up the stability parameters whether you base it on time or the degree (temperature) variation

The tolerance/hysteresis of the soak stability detection can be adjusted to suite the user, this defines how stability is determined in the soak.

Stability detect is measured in 3 ways.

1. Timeout, see below
2. Automated detection, see below
3. Manual stability, the user can determine when stability has been achieved and can use the manual override button on the TUS screen to register stability.



- **Timer Enable** - Default is off. Check this to enable the Stability Detect Timer
- **Time -** (default 10 mins). Timer based stability, the system will be deemed stable after the defined period of time that all TC's remain within tolerance from the point at which they all enter the soak band.
- **Auto Enable** - Default is off. Automatic stability, Stability will deemed to be achieved when all TC's are within tolerance band required for soak for class and no TC continues to change in temperature by more than a user defined degree step between readings.
- **Degree Change -** This becomes enabled when Auto Enable is activated. Default is 0.5 degree over 2 mins, looks for an amount of temperature drift on any TC.

Pens

Select the ***Pens*** tab to display all the pens available and the associated pen tabs, including:

General - Enter individual pen information. *See "General tab" on page 77*

Scales - Set up scale parameters for each pen. *See "Scales tab" on page 78*

Logging - Set up logging configuration for each pen. *See "Logging tab" on page 79*

Maths - Edit the maths or this particular pen. *See "Maths tab" on page 80*

Totals - Set up Totaliser settings for each pen. *See "Totals tab" on page 82*

Alarms - Set up the alarm profiles for each pen. *See "Alarms tab" on page 84*

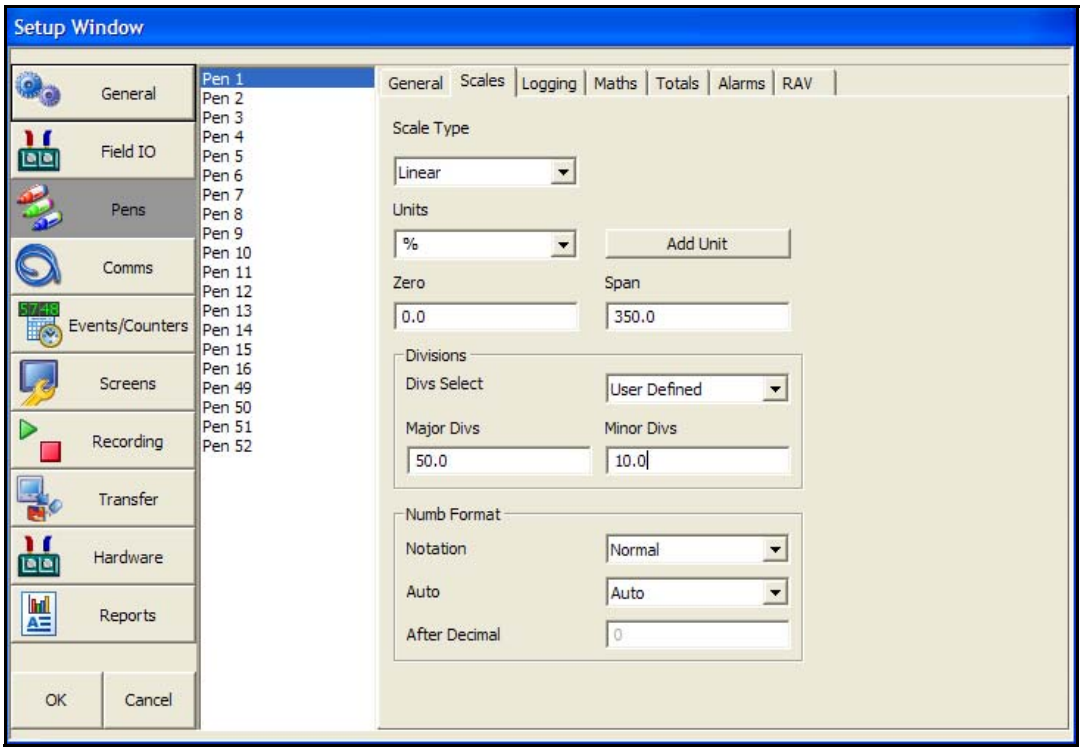
RAV - This will display the ***Rolling Average*** for this pen. *See "RAV" on page 86*

General tab

- **Enabled** - Tick to enable
- **Tag** - Select and use the on-screen keyboard to type in an identifier for the pen. Up to 48 characters.
- **Description -** (Screen Designer screens only) Enter a screen description in this field that will then be displayed on the Screen Designer screen.
- **Group** - This pen can be allocated to a group of pens. If you select a group here this pen will be added to it. The group can then be renamed, to rename these groups, see *"Groups tab" on page 59*. The AMS2750 screen has a group name selection where you can select the groups 1 to 6. Screen setup is done in the recorder. Groups 1 to 6 relate directly to furnaces 1 to 6.
- **Line Options -** Select and set the ***Trace Width*** for this pen when it is displayed on a chart. The default trace width is 1 with a maximum of 7.
- **Change Colour** - Each Pen has a ***Default Pen Colour*** but this can be changed if required. Select and use the colour palette to set the pen colour.

Scales tab

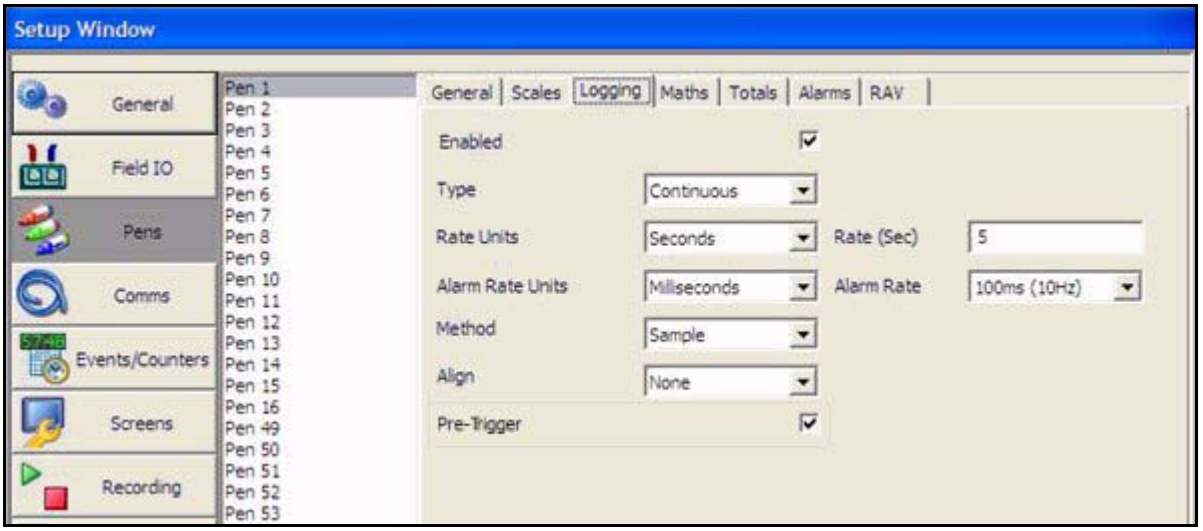
Individually configure each scale per pen in the scale menu. Select a pen from the list of available pens.



- **Scale Type -** Select this for a list of available scale types; ***Linear*** or ***Logarithmic*** (Log).
- **Units -** Scale measurement ***Units***. Select this and enter the units. Up to 16 characters.
- **Zero -** This is the bottom of the scale. Select and enter a ***Zero*** value.
- **Span -** This is the highest value of the scale. Select and enter the ***Span*** value.
- **Divs Select -** Only available with ***Linear Scale Type***. Toggle between ***Auto or User Defined***.
- **Major Divs -** Only available when ***Divs Select*** is set to ***User Defined***. Select and enter the major division position.
- **Minor Divs -** Only available when ***Divs Select*** is set to ***User Defined***. Select and enter the minor division position.
- **Start Decade -** Only available when the ***Scale Type*** is set to ***Log***. Select and enter the start value of the first decade.
- **No. Decades -** Only available when the ***Scale Type*** is set to ***Log.*** Select and enter the number of decades required. Max 99 decades (although not all will be displayed).
- **Number Format -** Displays the ***Notation*** of the number format, ***Scientific*** or ***Normal***.
- **Notation -** Toggle between ***Scientific*** or ***Normal*** number format.
- **Auto -** Toggle between ***Auto and User Defined***.
- **After Decimal -** Only available when ***User Defined*** is selected. Select and enter the number of decimal places. (up to 15 decimal places)

Logging tab

Click on Logging to set up each logging profile per pen..



- **Enabled -** Tick to activate or de-activate logging for this pen.
- **Type -** Toggles between ***Continuous*** or ***Fuzzy*** logging.
  - Continuous logs every value based on the ***Method*** chosen (***Sample, Average or Max/Min***).
  - ***Fuzzy Logging*** has been developed as a secure data storage technique which has a self teaching data storage algorithm so the recorder stores data at a variable rate to match the process being monitored. Fuzzy Logging has intelligent resources to enable the most effective and efficient way of using the scan rate, storage capacity and recording time.
- **Rate Units -** Set the ***Units*** for the logging rate to be displayed. Select and choose the logging rate units from the drop down menu.
- **Rate (***) -** This is the speed at which data is required to be logged. If the Millisecond option is selected as the ***Rate Units*** for the logging, then a drop down menu of options will appear. When all other Rate Units are selected a keypad will appear for user entry. Fastest rate is 20mS and slowest is 60 hours.
- **Alarm Rate Units -** Set the Units for the ***Alarm Rate Logging*** to be displayed. Select and choose the alarm logging rate units from the drop down menu.
- **Alarm Rate -** This is the new logging rate used when this pen goes into an active alarm state. To enable this feature to change the logging rate in an alarm state, see ***Change Log*** in the Alarms menu. Change Log must be active in the Alarms tab.
  If the Millisecond option is selected as the Alarm Rate Units for the logging, then a drop down menu of options will appear. When all other Alarm Rate Units are selected a keypad will appear for user entry.
- **Method -** Only available if the logging ***Type*** is set to ***Continuous***. Select from a list of Methods.
  - ***Sample*****:** logs the last sampled reading.
  - ***Average*****:** logs the average of all the samples taken since the last log.
  - ***Max/Min*****:** logs the highest and the lowest of the sampled readings since the last log.

- **Align -** Only available if the logging ***Type*** is set to ***Continuous***. Select and enter a value from the list to align the logging at specified intervals. This will hold the start of logging until the aligned time selected occurs based on the recorders real time clock.

- **PreTrigger** - activate pre-triggering for that pen, any alarm on that pen will cause the pre-trigger system to be activated. Only the first 16 pens can be configured for pre-triggering. For details on the Pre-Trigger function and configuration for the pre-trigger time is held in the recording menu in the setup configuration, see *"Pre-Trigger" on page 109*.
  The alarm rate for each pen will be used for the pre trigger rate. The alarm rate must be set to less than 10 seconds per sample for pre-triggering to operate.
  Pre trigger will only operate when the logging is in continuous sample mode, pre-triggering will not be available with fuzzy logging or MaxMin.

- **Auto Fit -** Only available if the logging Type is set to ***Fuzzy.*** Toggles On and Off. ***AutoFit*** ensures that the last sampled data point is logged before the signal goes out of the tolerance set in Band 1 or Band 2. When displayed on a graph, the input signal will automatically fit to this last logged point. This gives a better fit for stepped input changes.

- **Band 1 % -** Only available if the logging Type is set to Fuzzy. This is where the tolerance is set for the input signal. Specify, as a percentage of the scale range, the tolerance band allowed above and below the input signal. Select and enter a value.

- **Fuzzy Band 2 -** Only available if the logging Type is set to Fuzzy***.*** Toggles On and Off. This is to enable a second tolerance to be set, configure it to be On to activate. Only used in conjunction with Autofit On, to specify the Band 2 %.

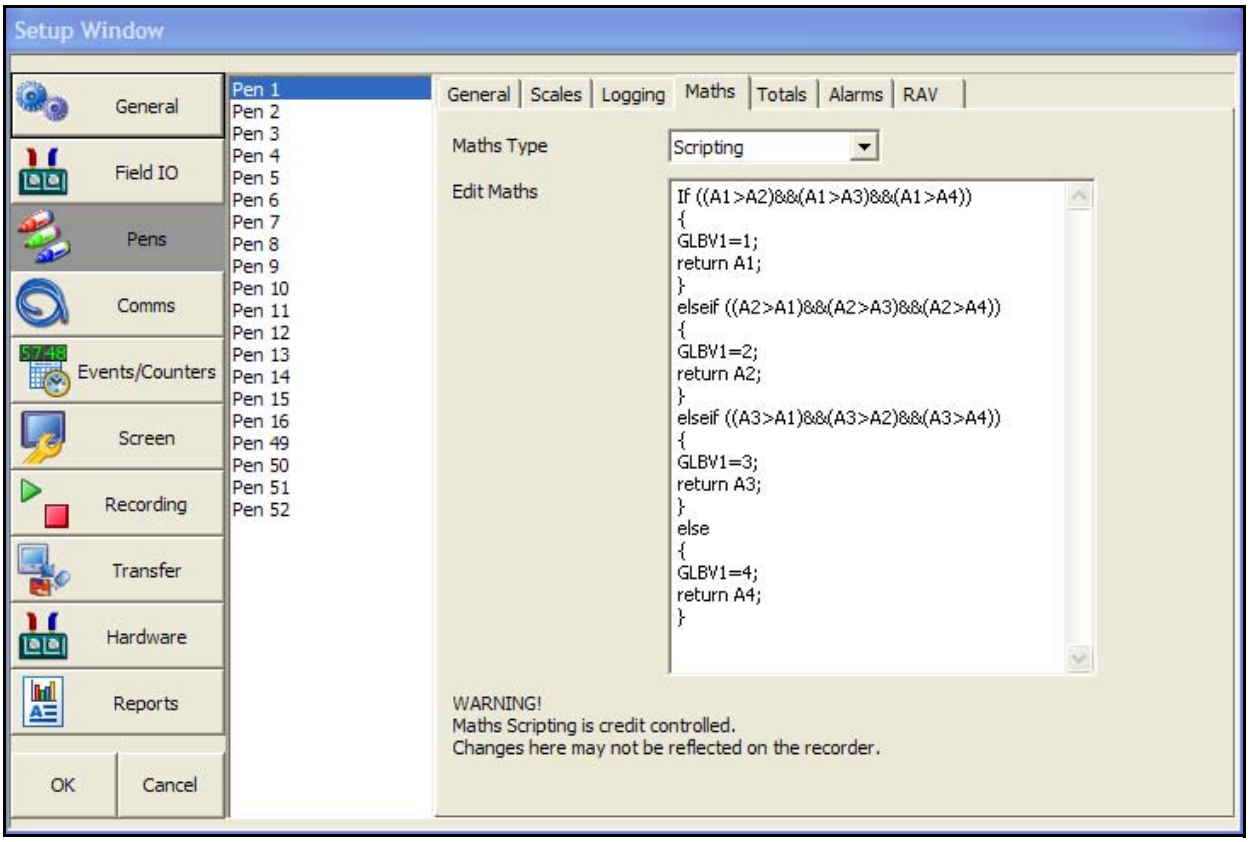
- **Band 2 % -** Only available if the logging Type is set to Fuzzy. This is where a tighter tolerance can be specified which must be set within the limits of Band 1. Specify, as a percentage of the scale range, the tolerance band allowed above and below the input signal. Select and enter a value.

Maths tab

Analogue signals may have a mathematical calculation performed on them before they are represented as a pen. ***Basic Maths*** is standard in all recorders. ***Full Maths*** or ***Scripting*** are options that must be activated in the recorder.

- **Maths Type** - Analogue signals may have a mathematical calculation performed on them before they are represented as a pen. Basic Maths is standard in all recorders. Full Maths and Scripting are Firmware credit options that must be activated in the recorder. If your recorder setup has Full Math or Scripting enabled basic maths is disabled.

- **Edit Maths** - Edit the Maths for this particular pen. If a Pulse input card is fitted the first 4 pens will display the maths function of HPULn as default to display the pulse reading. For details see *"Appendix B - Maths Expressions for X & GR Series Recorders" on page 263*.

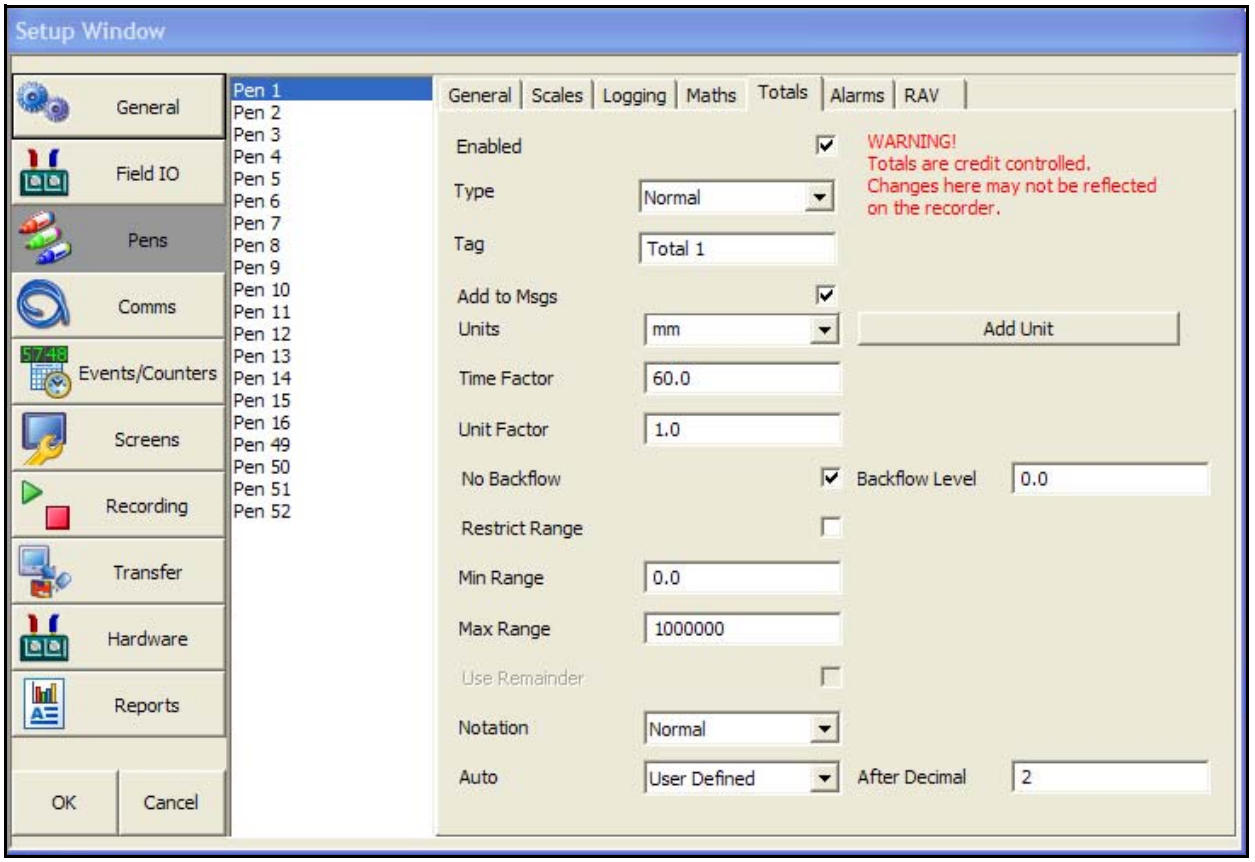


Maths expressions can be applied to extra pens. Up to 12 extra pens are available on the **QXe, GR1**, 16 for the **QX, GR2** and up to 48 extra pens on the **SX, GR3** recorder. Go to the credits tab to check if the recorder has any extra pens.

Totals tab

To use the Totals option on the recorder it must be enabled as a firmware credit option.

FIGURE 6.1 Totals tab set to Normal



For example the Totaliser function is associated with flow monitoring applications. The input to the recorder would be a measure of flow rate (ie. In litres per second) and the total amount that has flowed over a specified time period. Multiple totalisations are possible with the use of extra pens (firmware Credit option). Totalisation values are 10 digits plus exponent.

Select a pen from the list.

- **Enabled -** Tick to activate or de-activate totalising for this pen.
- **Type -** Select this for a list of Types of totalising. Normal or Sterilisation. Normal totaliser function is usually associated with flow monitoring applications. *See "Sterilisation variations" on page 83.*
  Sterilisation* is where items are subjected to heat over a period of time. Each pen can be totalised according to the Fo or Po sterilisation* function at 250 °F (121.11°C). The Standard Reference Temperature and Thermal Resistance (Z Value) are adjustable. All temperature limits are adjustable. Start temp, Reference temp and Z factor are all user defined, allowing support for many different types of sterilisation applications. *See "Sterilisation" on page 84.*
- **Tag -** Select and enter an identifier for the pen. Up to 17 characters.
- **Add to Msgs** - Toggles On and Off. Select this to add a totaliser to the messages screen.
- **Units -** Normal Totaliser only. This is the Units of Measurement for the totaliser. Select units from the drop down menu or click in the Units window and type in text. Click on Add Units to add your units to the list, up to 12 characters.

- **Time Factor -** Normal Totaliser only. Time factor – Totaliser adds a value once per second, so you need to Divide by this factor. For example:
  If your flow meter is in units/second Time factor is 1.
  If your flow meter is in units/minute, the unit will DIVIDE by the time factor, in this case 60 – so every 1 second, 1/60th of the unit is added.
  If your flow meter is in units/hour, the unit will DIVIDE by the time factor, in this case 3600 – so every 1 second, 1/3600th of the unit is added.

- **Unit Factor -** Normal Totaliser only. The Totaliser adds the engineering unit from the instrument, onto the total (after the time factor is applied). You then need to Divide by the unit factor. For example:

  If your flow meter is in litres/time and you want to Totalise in litres – there is 1 litre in 1 litre, so your unit factor would be 1, so every 1 second 1/1 unit is added.
  If your flow meter is in litres/time and you want to Totalise in Cubic meters – there are 1000 litres in 1 cubic meter, so your unit factor would be 1000, so every 1 second 1/1000th of a unit is added.

- **No Backflow -** Normal Totaliser only. If the flow reading should go into a negative value, eg. The flow meter has been switched off, and “No Backflow” is inactive, the totaliser will subtract from the total value. When “No Backflow” is active any negative values are ignored and the total value is held while the flow meter is off until the backflow level is exceeded.

- **Backflow Level -** Only active when No Blackflow is set. Set the level at which totalising will stop if the signal flow goes below this limit and if the No Backflow option is active.

- **Restrict Range -** Normal Totaliser only. Toggles On and Off. When active this will allow access to the Min and Max Ranges to be set.

- **Min. Range -** Normal Totaliser only. Only available when Restrict Range is active. Select and enter the minimum limit for the totals to range from.

- **Max. Range -** Normal Totaliser only. Only available when Restrict Range is active. Select and enter the maximum limit for the totals to range from.

- **Notation** - Toggle between Scientific or Normal number format.

- **Auto** - Toggle Between Automatic number formatting and User Defined.

- **Use Remainder -** If the total exceeds the maximum scale limit, the total will reset to the minimum limit. When Use Remainder is active, it will carry over any amount in excess of the maximum scale limit.

- **After Decimal** - Only available when User Defined is selected. Select and enter the number of decimal places. (up to 15 decimal places)

Sterilisation variations

- **Temp Input Units** - For Sterilisation Type, select the temperature input units.

- **Start Temperature -** For Sterilisation, select the Start Temperature.

- **Reference Temp. -** For Sterilisation, select the Reference Temperature.

- **Z Factor Temp. -** For Sterilisation, select the Z factor temperature

- **Include Cooling -** For Sterilisation, Include Cooling if required

- **Completion Value -** For Sterilisation, if cooling is not required, enter a Completion Value.

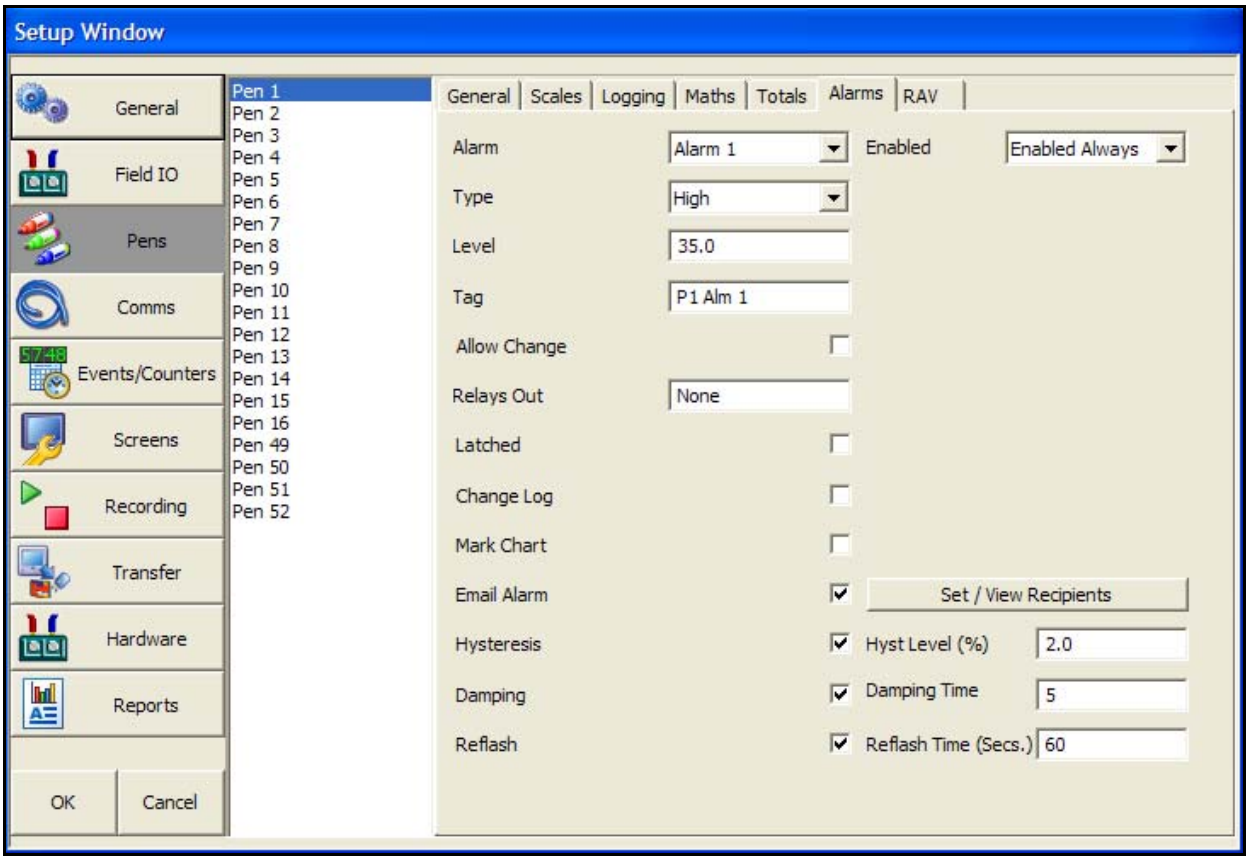
Sterilisation

*Specification for Sterilisation. The definition Fo/Po is the sterilisation/pasteurisation time in minutes required to destroy a stated number of organisms with a known z at temperature T. For example, "F18/250" represents the time in minutes required to destroy a stated number of organisms at a temperature of 250F (121.11C) with a z = 18 degrees F. F values are used to compare the sterilizing values of different processes, however, F values cannot be compared unless the z values are the same. When temperature is not specified (for example, F = 8.6) it is understood that the temperature is 250F (121.11C); the subscript O (as in the term Fo = 7.4) is used to indicate that the z = 18 degrees F and the temperature is 250F (121.11C)

Alarms tab

Select from the list of available pens in the window. You will be setting up alarms on this pen only. Select the first available alarm eg. Alarm 1 and configure each alarm as required for each pen.

When an alarm has been configured an Alarm Marker or Pen Pointer will appear on the recorder for each alarm depending on the type of process screen.



- **Enabled -** Select Enable to see a list of ways to enable or disable the alarm. Disable, Enabled Always or Dig Enabled.
- **Enabled by Digital -** Only available when Enabled is set to Dig Enabled. Select and choose which digital signal(s) will enable this alarm (on this pen only).
- **Type** - Select this to display a list of different types of Alarms. High, Low, Deviation, Rate Up or Rate Down. Set a High alarm to activate when the signal goes above the Alarm Level, or set a Low alarm to activate when the signal goes below the Alarm Level. Devia-

tion is the how far this pen can deviate from the Ref Pen before triggering an alarm. See Deviation Level and Ref Pen.
Rate Up and Rate Down Alarms are used to trigger an alarm when the signal changes a defined amount over a specified time. See Deviation Level and Time Period.

- **Level -** Select and enter a figure at which the alarm is to be triggered.
- **Deviation Level** - Only available when Alarm Type is set to Deviation, Rate Up or Rate Down. Select and use the numeric keypad to enter the amount of deviation (in engineering units). For Deviation enter the amount of deviation allowed on a designated pen (Ref Pen) before an alarm is triggered.
  For Rate Up and Rate Down enter, as a percentage, how far the signal can deflect before an alarm is triggered. rate Up and Rate Down are tied to a time period and it doesn't stand alone - it is a rate of increase or decrease.
- **Ref Pen -** Only available when the alarm Type is set to Deviation. Select and enter the pen that this alarm is referenced to. This works like an actual pen that dynamically tracks a designated pen.
- **Time Period** - (Only available when the Alarm Type is set to Rate Up or Rate Down). Enter (in seconds) how long the signal is allowed to deviated, at the specified deviation level, before an alarm is triggered.
- **Tag -** Enter a Tag or name to identify this alarm. Up to 17 characters.
- **Allow Change -** If activated this will allow quick configuration changes to this alarm level from the alarm button found in the top menu bar on a process screen in the recorder, without having to enter the setup. **This does not change the original setup**.
- **Relays Out -** Select and choose which Relay Output(s) is triggered by this alarm (on this pen only). The ***Fixed*** button will use the common relay output on the power board (24V relay).
- **Latched -** A latched alarm will maintain in its active state until the trigger source has returned to a non-alarm state and the alarm has been acknowledged. A latched alarm will continue to flash, if an alarm marker or pen pointer is displayed, until it is acknowledged and in a non-alarm state. A Reflash option is available to keep the alarm flashing whilst in an alarm state even after it has been acknowledged. See Reflash.
- **Change Log -** Toggles On and Off. Select this to change the Log speed when an alarm occurs. The Log rate changes when alarm is active and stays at the alarm rate for as long as the alarm is active then returns to the normal logging rate. Set up the new alarm logging rate in Alarm Rate in the Logging Tab.
- **Mark Chart -** Toggles On and Off. Selecting On will place a Mark on the Chart with automated messages when the alarm becomes active.
- **Email Alarm** - Enable this to send an email when any alarm is triggered on this pen. This function is a firmware option that is activated in the recorder.
- **Set/View Recipients** - Only available when email has been enabled. Select your recipients from the list provided. Email addresses and Server names must be entered in *"Email tab" on page 90.*
- **Hysteresis -** (not available for Deviation). Toggles On and Off. When this is activated, you can set a tolerance level for an alarm. It allows a specific percentage value of the span of the scale to be added to the alarm level.
- **Hyst Level % -** (not available for Deviation alarm). Enter as a percentage of the span of the scale. This is how much tolerance the signal can have past the set alarm activation point until the alarm is de-activated.
- **Damping -** Toggles On and Off. When switched On, the alarm level must be breached for a specific period of time before an alarm is triggered. ***Damping*** works going into alarm only.
- **Damping Time -** Set the amount of Damping Time in seconds

- **Reflash -** Toggles On and Off. Activate this to re-enable an active alarm that has been acknowledged. Set the Reflash Time.
- **Reflash Time -** Only enabled when Reflash is active. Set the time period after the alarm has been acknowledged for the alarm to reflash if it is still in an alarm state.

Up to 144 integral “soft” alarm set points are available for the **QXe, GR1**, 192 for the **QX, GR2**, and 576 for the **SX, GR3** recorder (6 per pen).

RAV

This will display the Rolling Average for this pen. The recorder takes an average of the number of samples entered.

- **Enable** the RAV function
- **Number of Samples**. For example a 1 hour rolling average made up of 1 minute averages it would be 60 seconds per sample with 60 samples, and you can increase the time span accordingly, so 1440 samples at 60 seconds per sample would give you a 24 hour rolling average made of 1 minute averages.
- **Sample Interval**, or how often a reading is taken, in seconds.
- **Prefill** works as follows, if you setup a 60 sample rolling average a 10 second samples that will create a 10 minute rolling average, with each sample being accumulated as an average from the current recorder processing rate (10Hz say), so each 10 second sample is added to a queue of 60 samples, and each 10 seconds the new rolling average is calculated. The prefill simply takes the current pen value and fills the queue with that average, causing the "damping" effect to be baselined at the current reading. No prefill will cause the first few samples to have a greater effect on the average, as they will not be diluted by 60 samples but 1, 2, 3, 4 up to 60 after the 10 minutes.

Comms

- **Modbus -** Communications protocol for ***Ethernet*** and ***RS485***.
- **Web -** Browse your recorder using the web browse feature. *See “Web tab” on page 90*.
- **Email -** Setup email accounts to send alarm and event information. *See “Email tab” on page 90*.
- **SNTP -** ***Simple Network Time Protocols*** is a protocol for synchronising the clocks of computer systems and other devices over ethernet networks. *See “SNTP tab” on page 91*.
- **TCP/IP** - ***Transmission Control Protocol/Internet Protocol***. A protocol for communication between computers, recorders and other devices. *See “TCP/IP tab” on page 92*.
- **Network Admin** - Network Admin is required for printers on a network and shared or work group printers. *See “Network Admin tab” on page 94*.
- **FTP** - ***File Transfer Protocol***. Used to transfer data to and from the recorder. *See “FTP tab” on page 94*.
- **Peer to Peer** - Sets up the recorder to be identified on a network. *See “Peer to Peer tab” on page 95*.

Modbus tab

Modbus can be used with RS485 or Ethernet ports. The ***Modbus*** protocol defines a message structure that controllers will recognise and use, regardless of the type of network over which they communicate. (RS485 is a hardware option for the **QXe** recorder).

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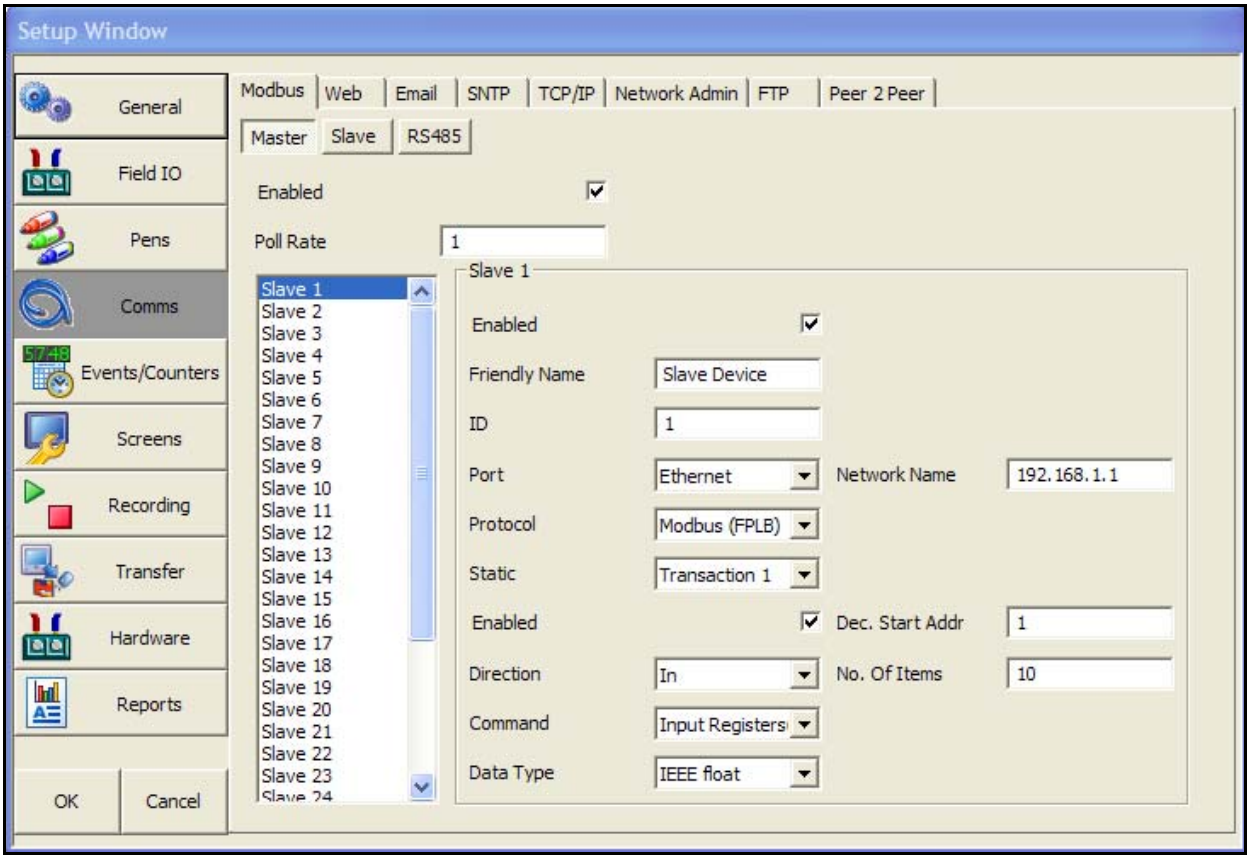
FIGURE 6.2 Modbus Master Configuration



Modbus Master Communications

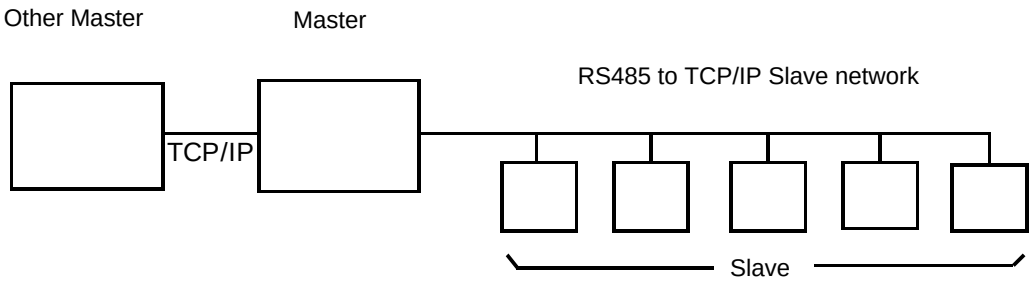
The recorder can communicate with up to 32 slave devices on both RS485 and/or Ethernet at a maximum poll rate of 1 second (slowest 1 hour). Each slave up to 8 “transactions” can be performed where a transaction can retrieve 1 or more registers from a slave or send one or more Pens to a slave.

Access to slave registers within the maths function has been provided using scv[x,y,z] where x = Slave number, y = Transaction Number, and z is the each successive register retrieved starting from 1.

The Modbus master can be used in conjunction with the Modbus slave functionality of the recorder, or OPC to enable the recorder to act as a communications bridge. Data from the slaves connected to a Modbus master is made available as a map on the slave side of the Modbus master; this allows another master to get access directly to another master’s slaves data without the master having to re-process that information. Or a Modbus master can process the data and expose it to the network as its own pens in Modbus or OPC.

Modbus master must be enabled as a firmware option and requires Full Maths or Scripting to assign values to a pen, see *See “Credits tab” on page 62*.

Refer to Modbus communication application notes on your CD or on our website



Refer to the Modbus Master Installation Instructions that are on the CD to help set up various devices to talk to the recorder.

Master

- **Enabled** - Toggle On to make this recorder a Master device
- **Poll Rate** - Enter a time period in seconds of how often there is a request for data
- **Legacy Ethernet** - Tick this to connect to **100mm & 180mm** recorders.

Slave 1 ..32 - Up to 32 slaves can be setup per master device. Setup each Slave in turn starting with number 1.

- **Enabled -** Toggle On to enable Slave #
- **Friendly name -** Enter a name to easily identify this slave device
- **ID -** This is to connect to slave ID
- **Port -** Select this for a list of available ports, either Ethernet or RS485. For port configuration see *"Ports" on page 94.*
- **Network Name -** (Ethernet only). Enter the recorders IP address or the Network name, eg. **xs-nnnnnn,** where nnnnnn is the recorder's 6-digit Serial number. *See "TCP/IP tab" on page 92* for the recorder's IP address and serial number.
- **Protocol -** Select this for a list of available protocols. Modbus or Modbus X*. Modbus and Modbus X can both use Ethernet or RS485 Ports. Protocols define the format in which the data is transferred from the recorder to a PC or transfer between other devices and peripherals. **FPLB** – Floating Point Little Endian Byte Swapped Format & **FP B** - Floating Point Big Endian Format are standard notations.
- **Static -** Transaction 1 ..8 is a request for a register or set of contiguous registers
  - **Enabled** - Toggle On to enable the first transaction request
  - **Direction** - Direction for the data to flow; In to or Out from the recorder
  - **Command** - This is the type of Registers used by the slave device. Refer to the individual memory map for the register type used for each type of device.
  - **Data Type** - Refer to individual memory maps for each type of device to determine the type of data. Eg. signed 16-bit int, unsigned 16-bit int or IEEE float.**X Series and GR Series** devices use IEEE float.
  - **Dec.Start Addr**. - This is the register address number to start the transaction from

- **No. Of Items** - Enter the number of items from the start address that are included in the transaction. For example displayed here will be:
  10 SCV[1,1,1] - [1,1,10].
  This means the transaction will take 10 items from the start address with a Serial Comms variable of Slave [1], Transaction [1], Register [1] - to Slave [1], Transaction [1], Register [10].

***Modbus X** - Modbus X protocol differs from standard Modbus by the 4 floating point order that is reversed for application compatibility.

Slave

- **Enabled** - Toggle On to make this recorder a Slave Device
- **Port** - Select this for a list of available ports, either Ethernet or RS485. For port configuration *"Ports" on page 94.*
- **Protocol** - Select this for a list of available protocols. Modbus or Modbus X*. Modbus and Modbus X can both use Ethernet or RS485 Ports. Protocols define the format in which the data is transferred from the recorder to a PC or transfer between other devices and peripherals. **FPLB** – Floating Point Little Endian Byte Swapped Format & **FP B** - Floating Point Big Endian Format are standard notations.
- **Slave ID** - This is a unique Modbus ID/Address used by the recorder to identify Modbus messages. Applications that talk to the recorder with Modbus will need to know this number to return messages to the device. If you are using the Communication Server on **Trend Server** the same Slave ID number must be entered. (1-254)

***Modbus X** - Modbus X protocol differs from standard Modbus by the 4 floating point order that is reversed for application compatibility.

RS485

- **Baud Rate** - (Only available when the RS485 port in selected). Select this for a list of available Baud Rates. This is the speed, in bps (bits per second), at which data is transferred.
- **Byte Options** - (Only available when the RS485 port is selected). Select this button for a list of available Byte Options. The Byte Options consist of 3 digits comprising of Parity (set to None N, Even E or Odd O), 8 Data Bits and Stop Bits, signifying the end of the character string, 1 or 2. The default is N-8-1 which means no parity, 8 data bits and 1 stop bit. This is currently the only byte option supported by Comms Server.
- **Line Turn Around** - (Only available when the RS485 port in selected). This is for a 2-wire line type. Data has to be fully transmitted before the line can be turned-around and data can be received, or vice versa.
- **Reply Delay** - (Only available when the RS485 port in selected). Enter a delay time, in milli seconds, before the recorder sends a reply. Recommended delay should be set to 12mS (min.) if using the Comms Server.

To check communications connections and trouble shooting network settings versus SCV parameters go to the recorder menu Status > Diagnostics > Comms. This screen will help to identify which area to focus on if the recorder connections are not doing what you expected.

Web tab

The ***Web*** browse function is enabled/disabled from the recorder. Select this to enable and allow the recorder to be browsed on a web page. Internet access is required. The Web function is password protected if passwords are enabled. For web browsing information refer to the recorder user manual. The recorder must have the Remote View option active which is a firmware credit option.

Email tab

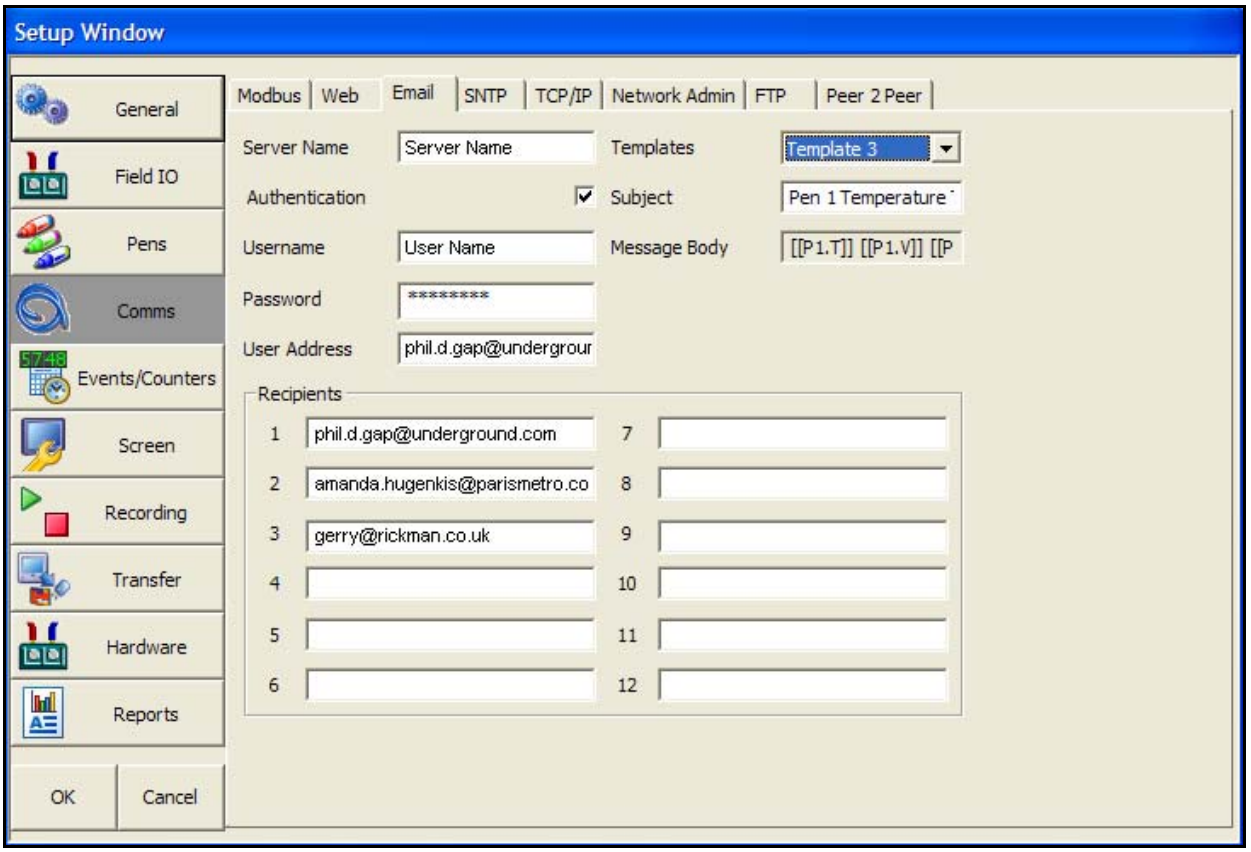
Set up this email menu in order to send emails for the following:

When an Alarm is triggered

As an Effect of an Event occurring, such as:

- **Alarms** – In to, Out of or Acknowledged
- **Totaliser** – Start, Stop or Reset
- **Digital Inputs** – On, Off or State change
- **TC Burnout** – on a specific Analogue Input channel
- **Scheduled Events** – Once, Interval, Specific days, Month End.

For more information on setting up events that will send emails, see *"Events/Counters" on page 95.*



- **Server Name -** Enter your server name that will handle the transfer of the emails. Ask your IT Admin for the server details. One method of finding this information is to go to Microsoft Outlook™, Tools, Email Accounts, select “View or change existing email accounts”. Select your email server from the box eg. Microsoft Exchange Server™ and click on the ***Change*** button. The server name you require is displayed in the Exchange Server Settings dialog. Enter this name exactly using the on-screen keyboard.

  If in doubt, contact you IT Administrator for advice on entering Server name requirements.

- **Authentication -** Enables/Disables the ***Username*** and ***Password*** which may or may not be required by the server. Check with your IT Admin.
  For network printers and drivers, if you intend to connect the recorder on a Microsoft network administered as a domain, you may have to authenticate the recorder as a user with sufficient permissions to use the resources that you want (network printer, network drive). Usually, several devices (computers or recorders) can be authenticated on the same network with the same name.

- **Username -** Enter your ***Network Logon Username,*** this may include your ***Domain Name***

- **Password -** Enter your ***Password*** associated with your user name. If you have a system where the log in password expires and requires you to change it periodically, you will need to update the logon password in the recorders when you are forced to change your PC password.

- **User Address -** Your ***Network Email Address.*** (or this could be a generic name used to identify the recorder). No spaces!

- **Recipients -** Enter up to 12 email addresses of the destination you want the email to be sent to.

- **Templates -** These are user defined templates containing email text. If you require standard text to be sent out in an email then set them up here and give it a template name. These templates can be used with the events function to send an email as an effect of an occurrence. *See “Events/Counters” on page 95.*

- **Subject -** add a subject heading (up to 50 characters), this will appear as the heading for your email.

- **Message Body -** Default to ***Empty Email***. Click in here to open the ***Email text box***. Type into the message body text box up to 80 characters per line and up to 100 lines of text can be entered including ***Embedded Process Values***. This will include specific pen data to your email. The template can be used as a part of the event function to email information to a recipient using maybe using a Schedule also set up in the Events menu. *See “Events/Counters” on page 95.*

SNTP tab

Simple Network Time Protocol is a protocol for synchronising the clock on the recorder with a Network Server.

- **Server Enable -** Tick to enable. Activate this to make this recorder the server. Other recorders, set up as ***Clients***, can synchronise their time to this server recorder.

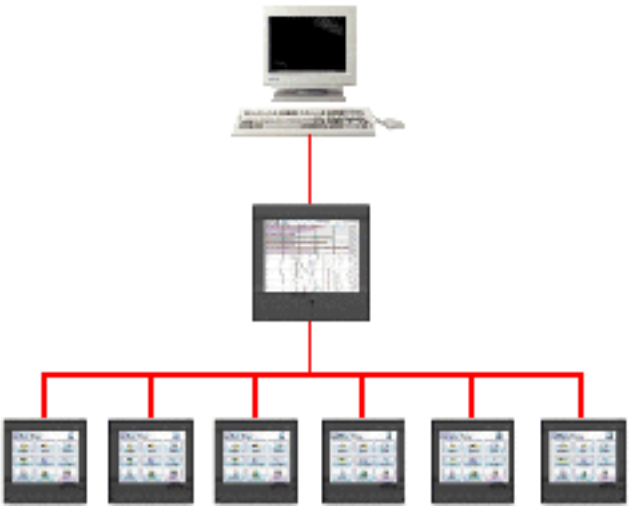
- **Client Enable -** Tick to enable. Activate this to set this recorder to synchronise time with the server. *Figure 6.3 on page 92.*

- **Server Name -** Only available when ***Client Enable*** is active. This is the name of the Network Server that can be used for time synchronisation. Enter the server name to be used for time synchronisation (this could be a ***Time Server*** on the internet or on your network). If a recorder is acting as the server, the client recorders must have the recorder’s network name as the ***Server Name*** (up to 32 characters). This is **“xs- nnnnnn”** where “nnnnnn” is the 6 digit serial number of the recorder.

- **Period -** Only available when Client Enable is active. Select and enter the time period in seconds required between checking and updating the time. This will default to 120 seconds. **X Series** recorders have a period limit of 60 to 3600 seconds, **GR-Series** recorders have a period limit of 600 to 3600 seconds.

- **Threshold -** Only available when Client Enable is active. This is a specified amount of time (in seconds) that the recorder clock must be within to ensure synchronisation with the network server. Eg. if set to 3600 the recorder time must be within 1 hour of the network server to ensure time sync will take place.

FIGURE 6.3 Network Server and Client/Server recorders



Client/Server Network

Figure 6.3 shows a Network Server (PC) at the top, a recorder acting as both a server and a client in the middle and a string of client recorders at the bottom. A recorder can be set up to be a server and a client. Setting it as both means this recorder will synchronise time with the network server. But will also allow other recorders to time sync with it. This saves many recorders trying to time sync with the network server.

TCP/IP tab

Transmission Control Protocol/Internet Protocol.

A protocol for communication between computers, recorders and other devices.

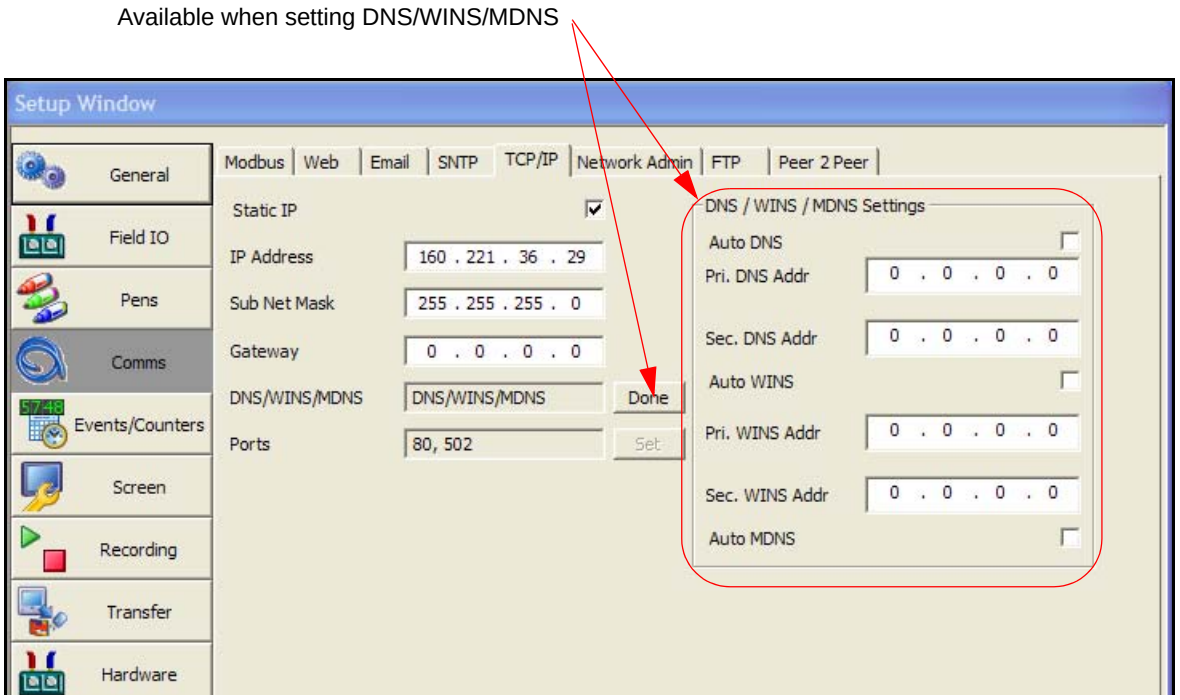
- **Static IP -** Tick to enable. This is an ***IP Address*** which is the same every time. With this feature Off, the recorder's IP address is created dynamically using a ***DHCP Server.*** with this feature On the IP address can be fixed by entering a known available IP address below.

- **IP Address -** (Available when Static IP is On). This is an identification address for communications between two devices. The IP Address identifies a specific recorder. When a recorder setup is loaded the IP address will be transferred.

- **Sub Net Mask -** (Available when Static IP is On). Acts as a filter when identifying an IP address

- **Gateway -** (Available when Static IP is On). A configuration parameter transmitted to each network device

- **DNS/WINS/MDNS -** Set to ***Automatic***, click on this to activate and de-activate options. ***DNS*** = Domain Name System, ***WINS*** = Windows Internet Name Service, ***MDNS*** = Managed Data Network Services.



Automatic DNS Names

The recorder will automatically register a unique Network ID using the serial number. The format is **xs-nnnnnn**, where nnnnnn is the serial number of the recorder. This allows you to locate the recorder for browsing if you are using DHCP (Dynamic Host Configuration Protocol).

DNS/WINS/MDNS

Defaults to Automatic, select Set to activate the options. ***DNS*** = Domain Name System, ***WINS*** = Windows Internet Name Service, ***MDNS*** = Managed Data Network Services. When complete select Done.

- **Auto DNS -** This is a sub menu for DNS/WINS/MDNS. Tick to activate. With this deactivated the DNS Server address can be changed from the default, if required.
- **Pri. DNS Address -** This is a sub menu for DNS/WINS/MDNS. Only available when Auto DNS **is deactivated.**
- **Sec. DNS Address -** This is a sub menu for DNS/WINS/MDNS. Only available when Auto DNS is deactivated.
- **Auto WINS -** This is a sub menu for DNS/WINS/MDNS. Tick to activate. With this deactivated the Windows Internet Name Service can be changed from the default, if required.
- **Pri. WINS Address -** This is a sub menu for DNS/WINS/MDNS. Only available when Auto WINS is deactivated.
- **Sec. WINS Address** - This is a sub menu for DNS/WINS/MDNS. Only available when Auto WINS is deactivated.
- **Auto MDNS -** This is a sub menu for DNS/WINS/MDNS. Tick to activate. This will deactivate the Managed Data Network Services.

Ports

Defaults to 80, 502, select Set to activate the options. The port settings are associated with the IT system in use. Port settings are set to a default but can be changed by the user to allow data traffic to use a specified port. When complete select Done.

- **HTTP -** ***HyperText Transport Protocol*** is the communications protocol that enables Web browsing. Select and enter the desired port number if required.
- **Modbus -** communications protocol used for automation applications. Select and enter the desired port number if required.

Network Admin tab

This must be set up to ensure network printing can be performed without being prompted for this information each time you want to print. This information will remain after a firmware upgrade.

Network Admin is required for printers on a network and shared or work group printers. Shared or work group printers must contain the correct file path, see *"Printer tab" on page 62.*

- **Username -** Enter your network ***Logon/Username***
- **Password -** Enter you ***Network Password***. For a local printer connected directly to the recorder via USB no domain is required. Ensure the printer name is set to the default (LPT1:), see *"Printer tab" on page 62.*
- **Domain -** For network printers enter your network domain. No domain is required for Local printers connected directly to the recorder via USB.

If in doubt, contact you IT Administrator for advice on entering Network Admin requirements.

FTP tab

File Transfer Protocol

This is a method of transferring data and setups to and from ***Trend Analysis software*** and the recorder.

- **Enabled -** Tick to enable FTP transfer
- **Allow Upload -** Tick to allow FTP transfer and Secure Communication Interface**from** ***Trend Analysis software*** **to** the recorder.
- **Allow Download -** Tick to allow FTP transfer and Secure Communication Interface **from** the recorder **to** ***Trend Analysis software***.
- **Log Messages -** Tick to add a message to the messages list when an FTP transfer is performed
- **Mark Chart -** Can only be active when Log Messages is enabled. Tick to mark the chart when an FTP transfer is performed.

Refer to the Communications section in the User manual and *"Importing via FTP or Secure Communications Interface" on page 156* for setting up FTP transfer.

Peer to Peer tab

The Peer services communication function sets up the recorder so it can be recognised on a network containing **X Series and GR** recorders. This means that multiple recorders will be able to discover other recorders on the same local network in order to share data between them. For example basic unit information such as firmware version, recorder name and network identity. This will be used mainly with the **Trend Analysis** software to allow discovery of recorders in order to transfer data via FTP or Modbus.

- **Enabled** - tick to enable
- **Set Number –** Default to set 1, this should not have to be changed unless a lot of recorders are being used on the same network.
- **Start Port** - Default port number 8955
- **End Port**- Default port number 8970

The port numbers have been specially selected for this type of network communications. It is recommended that the ports are **not** changed unless specifically requested by your IT network administrator. If this is changed on the recorder it must also be changed on all other recorders, **Trend Server** and Comms Server.

Events/Counters

See "Counters" on page 105

See "Preset Markers" on page 105

See "Time Sync" on page 106

Events tab

Events is a firmware option that can be activated using the credit system in the recorder.

Events are certain conditions or operations which can be set up and logged according to the time and date of the occurrence. Subsequently events can be reviewed in a list or represented on a graph.

An event is made up from a Cause and an Effect. Set up a cause such as Pen 1 going into an alarm state and the effect of this could be to start a totaliser or acknowledge the alarm.

Select the first available event eg. Event 1. Tick to Enable and change the Event Tag if required. Each Event has two Causes and two Effects available, these can be used in different combinations:

- An event can have up to 4 causes that triggers just one effect eg. A pen going into alarm, a Totaliser starts, Max/Mins reset and a Batch starts. This could have the effect of starting Logging.
- An event can have one cause that has up to 4 effects, eg. A pen could go into alarm and the effects could be that the alarm is acknowledged and a Totaliser is started, there is a Mark placed on the chart and an Alarm is sounded.
- An event can have up to 4 causes that have up to 4 effects, eg. A pen goes into alarm and a Totalisers is started, A scheduled export starts and Max/Min values are reset. The effects could be the alarm is acknowledged and a mark on chart is displayed to show the start of the totaliser, an Email is sent to notify a scheduled export has been made and a sound effect is played to identify the Max/Min values have been reset.

In summary Cause 1, 2, 3 ***or*** Cause 4 will trigger Effect 1, 2, 3 ***and*** Effect 4.

Table 6.3 : Events - Cause and Effect

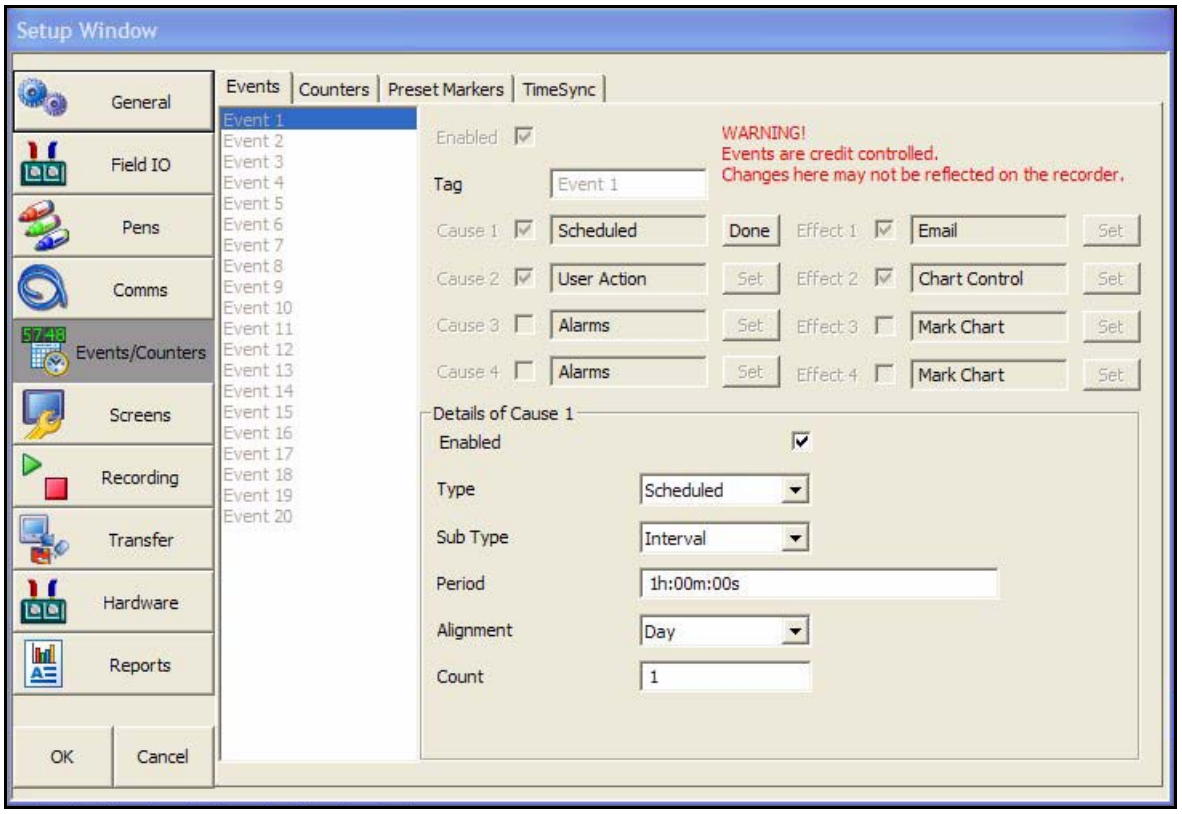
Cause		Effect
Alarm	Into Alarm	Mark on Chart Logging Totaliser Digital Outputs Alarm Acknowledge Email Screen Change Print Screen Counters Max Mins (Reset) Chart Control Clear All Messages Delayed Event Script Timers Play Sound Display Alert Batch Reports Update Tabular Readings Enter Replay Screen Exit replay Screen Change Chart Speed
	Out of Alarm	
	Acknowledge Alarm	
Totalisers	Start	
	Stop	
	Reset	
	Rollover	
Digital Inputs	On	
	Off	
	State Change	
T/C Burn Out	Analogue Input #	
Scheduled	Once	
	Interval	
	Specific Days	
	Month End	
User Counters	User Counter #	
Max Mins (Reset)	Reset Max/Min values	
System	Power On	
	Setup Change	
	Internal Mem. Low	
	Export Mem Low	
	FTP Mem Low	
User Action	Mark Chart	
	Hot Buttons (x4)	
Batch	Start Batch	
	Stop Batch	
	Pause Batch	
TUS	Start	
	Stop	
AMS2750 Timer	TC Timers	
	Process Timers	

For Maths variable for counters, see *"Maths Variable and Function Tables" on page 264*

When selecting Totalisers and Alarms etc. ensure they are enabled and configured in the Pens tab.

Setting up an Event

- Select an Event # from the Events list and click in the Enabled box.
- Set the Tag or name of the Event for identification



Event Causes

Click in Cause # and select the Set button and choose the cause of the event from the list provided:

- **Alarms -** Set to cause an event when a pen goes Into Alarm, Out of Alarm or an Alarm is Acknowledged. Set the pen number and the Alarm that will trigger this event.
- **Totalisers -** Set to cause an event when a totaliser Starts, Stops, is Reset or a Rollover is required. Select which pen has been set up as a totalise pen to trigger this event.
  The upper limit for the totaliser count is fixed to 16777215 to prevent an inaccuracy in the calculation above this upper limit.
  The Totaliser Rollover occurs automatically once the count reaches the accuracy limit and totalizser starts counting from zero. If user fails to configure the event totaliser will auto reset.
  The Rollover cause gets triggered each time the totaliser rollover occurs, above the accuracy limit.
- **Digital Inputs -** Set to cause an event when a Digital Input is turned On, Off or has a State Change. Select the Digital to trigger this event.
- **TC Burn Out -** Click in the text box to select which analogue input has a thermocouple on that will trigger this event when it goes into a burnout state.

- **Scheduled -** *See "Scheduled Events" on page 98*
- **User Counters** - *See "User Counters" on page 100*
- **MaxMins(Reset)-** A manual reset of the Max/Min values by the user can be used as a cause to then trigger an effect. Max Min values can be reset in the process menu on the recorder.
- **System -** An occurrence in the system can be used as a cause to trigger an event effect. System occurrences include Power On, Setup Change, Internal Memory Low, Export Memory Low and FTP Memory Low. The system monitors the memory storage levels and triggers the alert when the low level set is reached. To set the memory low level go to *"Storage Alarm" on page 109.*
- **User Action -** Select a User action such as placing a mark on the chart as a cause to trigger and event. Or add a Hot Button which can be displayed on an active Trend screen on the recorder.

• • The Hot Button function, when active as a cause. The user can click the Hot Button on the active screen and the corresponding event (that the user needs to set) will be triggered. The hot button will display on active trend screens in top right of screen if enabled.

- **Batch -** Use a batch control as a cause to trigger an event effect. An event cause can be set up so that when you Start, Stop or Pause a batch it will cause an effect to occur. Batches work using groups of pens so when setting up an event with a batch control as a cause you must assign a group of pens. *See "General tab" on page 77.*
- **TUS (Temperature uniformity Survey)** - This will only be enabled if the AMS2750 TUS or TUS Process option has been enabled in the recorder credits menu. Select either Start or Stop TUS. When a TUS is started or stopped this can be used to trigger and effect. Refer to the User manual for more details.
- **AMS2750 Timer** - This will only be enabled if the AMS2750 TUS or the TUS Process option has been enabled in the recorder credits menu. Select TC Timers or Process Timers as a cause and set the Alert Type to Warning or Expired. Refer to the User manual for more details.

Scheduled Events

A scheduled event can be set up as a cause so that when a scheduled event occurs it triggers an effect. With scheduled events you can specify the time and date for something to happen. Eg. A schedule can be setup every weekday at 12.00pm to send an Email.

- **Enabled -** Tick to enable
- **Type -** Scheduled
- **Sub Type -** Set Once, Interval, Specific Days or Month End
  Once – This is a once only occurrence
  Interval - A scheduled can be setup at timed intervals eg. every 12 hours.
  Specific days - Select the day(s), time and how often (count) the schedule will occur. Eg. Friday at 12.00 with a count of 10 will carry on for 10 weeks or Monday through to Friday at 12.00 with a count of 10 will carry on for two weeks.
  Month End - If Month End is selected with a count of 10 it will carry on for 10 months. The recorder refers to a built in calendar and clock and will schedule the event to occur at midnight on the last day of each month.

- **Date/Time -** Only available when Once is selected as a Sub Type. Select the time and date for a one off occurrence.

- **Period -** Only available when Interval is selected as a Sub Type. Set the time interval for how often this event should occur, eg. every hour would be 1h:00m:00s

- **Alignment -** Only available when Interval is selected as a Sub Type. Select and enter a value from the list to align the scheduled event at specific intervals.
  For certain applications it maybe desirable for a relatively fast schedule interval event, for example every 10 minutes, to be aligned with a particular time. For example on the hour. When the alignment function is not used, the schedule interval starts immediately on committing the configuration. When the alignment function is used, the schedule interval starts when the first interval event coincides with a subsequent interval that lines up with the desired alignment ie. Top of the hour.

Figure 6.3 shows if a 10 minutes schedule is required to align with a whole hour, and the configuration is committed at 17 minutes past, the recorder will wait until 20 past before starting the schedule interval. As starting at 20 past with 10 minute increments will ensure alignment with a whole hour.

Figure 6.3 Interval alignment

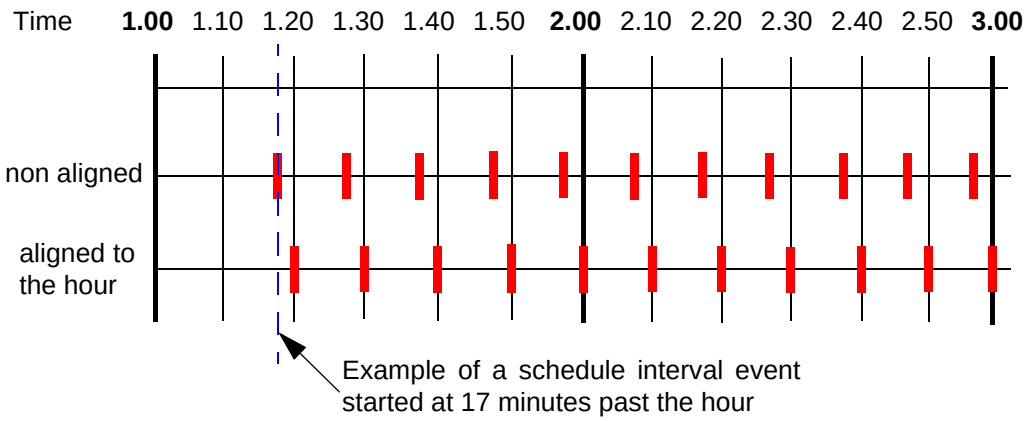


Figure 6.3 shows if a 10 minutes schedule is required to align with a whole hour, and the configuration is committed at 17 minutes past, the recorder will wait until 20 past before starting the schedule interval. As starting at 20 past with 10 minute increments will ensure alignment with a whole hour.

- **Count -** Only available when Interval, Specific Days or Month End are selected as a Sub Type. This is how often you want this to occur. The recorder will carry on with this schedule for the amount entered in the count. Eg. If 24 is entered into the count the scheduled event will occur at the specified time for 24 hours. A count of zero will carry on indefinitely.

- **Days of the Week -** Only available when Specific Days is selected as a Sub Type. Select the days of the week when this scheduled event is to occur.

- **Time of Day -** Only available when Specific Days is selected as a Sub Type. Select the Time Of Day when this scheduled event is to occur.

When the Event cause is finished click on the Done button. Now go to set up the Effect of the Event.

User Counters

User Counters are quite simply counters that are set up by the user. User Counters can be used as a Cause to trigger an Event Effect. The User Counter information must be setup before it can be used as a part of the event system. *See "Counters" on page 105*.

For a User Counter to be used as a Cause, a User Counter must already be set up and be counting something. eg. a User Counter as an Effect of another Event.

An example of this could be:

First setup your counter in the Counters menu. Enable it, Name it, enter what number it will Start At and enter at what number it will Rollover and start again. Event 1 has been set up with Cause 1 as a Scheduled interval every 30 seconds. The Effect is that User Counter 1 is set to increment by 1. When the scheduled interval occurs, every 30 seconds, Counter 1 will increment by 1.

A second Event can then be set up using the User Counter Effect in Event 1 as the Cause for Event 2. In this example the Cause will be triggered by User Counter 1 (in Event 1) reaching an increment of 50. The Effect of this will be a Mark on Chart.

In summary, what will occur from the two Events is: every 30 seconds a scheduled interval will cause a counter to increment by 1. When the increments reach 50 a mark will be placed on the Chart.

Event Effects

Click in Effect # and select the Set button and choose the effect of the event from the list provided:

- **Enabled -** Tick to enable
- **Type –** Choose from Mark on Chart, Logging, Totaliser, Digital Outputs, Alarm Ack, Email, Screen Change, Print Screen, Counters, Max Mins (Reset), Chart Control, Clear All Messages, Delayed Event, Script Timers, Play Sounds, Display Alert, Batch and Reports.
- **Mark on Chart -** Is an effect if a pen goes into an alarm state a mark will be placed on a chart and will display, for example: "Pen 2 Alm 1: Into Alarm (37)". Select Marker Type as Preset to display a list of all available markers that have been previously added to the recorder. To add Preset Markers go to *"Preset Markers" on page 105*. Select the Marker Type as User Defined to add pen information using Embedded Process Variable.

Embedded Process Values

Adding Embedded Process Values in a Mark on Chart means you can display other information such as pen information, Toltalisers, Digitals. See full list in *Table 6.6 on page 101*.

Table 6.4 :

Variable	Description
V	Value
T	Tag
Z	Zero range
S	Span range
U	Unit Text
time.v	Time in HH:MM:SS format

Table 6.4 :

Variable	Description
date.v	Date in DD:MM:YY format
td.v	Time and Date in HH:MM:SS and DD:MM:YY format
name.v	recorder name
id.v	recorder ID
serial.v	serial number

Table 6.5 : Adding Embedded Process Values

Text Entry	Function	Examples
[[P1.V]]	will embed the current Value of P1	<<16.233>>
[[P1.T]]	will embed the current Tag of P1	<<Pen 1>>
[[P1.Z]]	will embed the Zero point of P1	<<0>>
[[P1.S]]	will embed the span point of P1	<<100>>
[[P1.U]]	will embed the Unit text of P1	<<deg C>>
[[time.v]]	will embed the current time	<<11:51:23>>
[[date.v]]	will embed the current date	<<10:11:06>>
[[td.v]]	will embed the current time and date	<<11:51:23 10:11:0>>
[[name.v]]	will embed the current recorder name	<<Furnace1>>
[[id.v]]	will embed the current recorder ID	<<21>>
[[serial.v]]	will embed the recorder serial number	200034
[[BATMD1.v]]	will embed the batch mode. 1 = Running, 2 = Stopped, 3 = Paused	<<Batch-1- 0001234 Stopped >>
[[BATMD1.t]]	will embed the batch name	<<Batch-1-0001234 Group 1>>

Batch mode is for each group BATMD1 to BATMD6. Used in embedded variables as [[BATMD1.v]], will also allow the current batch name to be embedded using [[BATMD.t]].

Table 6.6 : more embedded variables

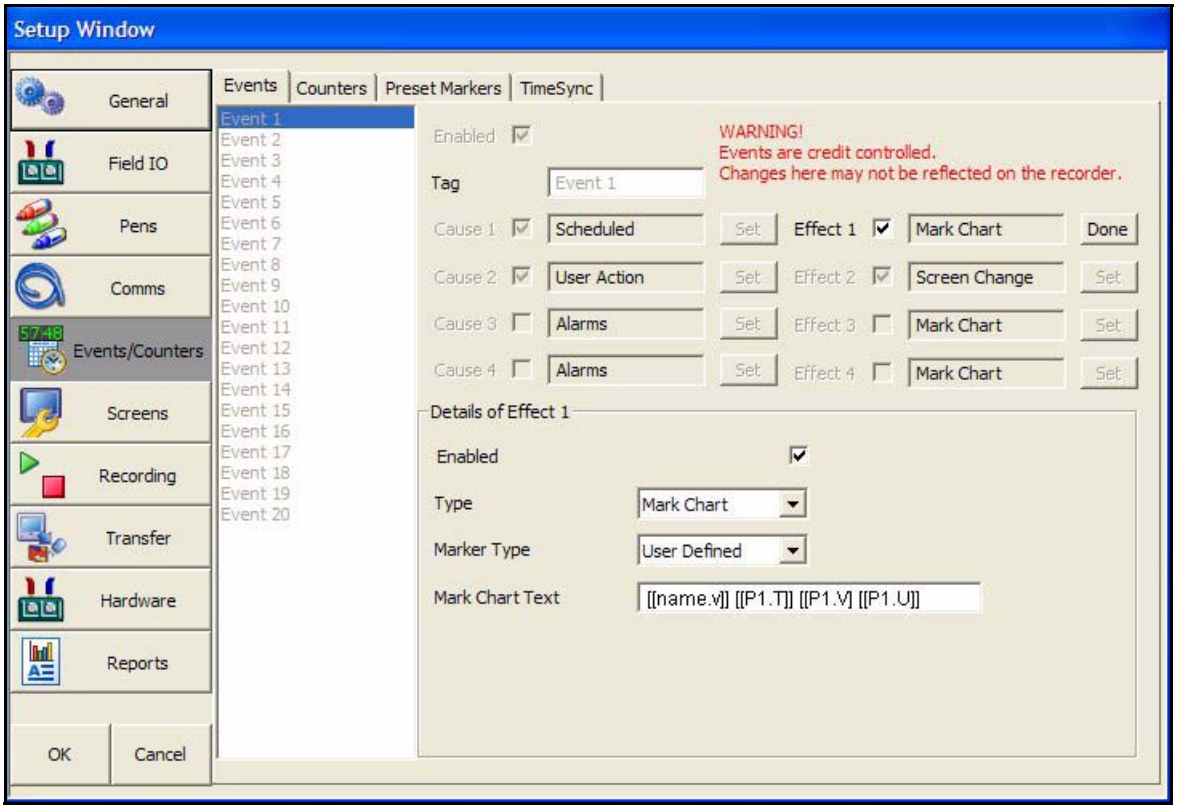
Syntax	Syntax	Syntax
An	GLBVn	HPULn
BATMDn	HPC1	LPULn
BLKVn	INTHRS	RAn

Table 6.6 : more embedded variables

Syntax	Syntax	Syntax
CFFREE	IOC1	RTCOMPn
CJCn	LPC1	RTCALn
CJCnC	Pn	Tn
CVn	PnAnL	UC1
Dn	PnMINU	USB1FREE
DIOn	PnMAXU	USB2FREE
EC1	PSTVn	UV1
FTPHRS	PRC	

This example shows pen information can be used as an embedded variable. Other information can be accessed by exchanging the Pn with the following variables, see *Figure 6.6.*

In Mark on Chart enter: **[[name.v]] [[P1.T]] is [[P1.V]] [[P1.U]**



Embedded variable must be in **CAPITALS**, spaces are allowed.

Event Effects (continued)

If the recorder name is Furnace1, Tag is “Temperature”, the current value is 14.81, and the Unit text is “Deg C”. The recorder will insert the name, pen tag, current pen value and units into the Mark on chart. The Mark on Chart will display: *Furnace 1 Temp 41.81 deg C*.

- **Logging -** Is an event effect that can Start or Stop logging, enter which one in Sub Type. From Selection Type choose either Multiple pens, Pen group or All Pens and select the relevant pen(s) below.
- **Totaliser -** Is an event effect that can Start, Stop, Reset or Reset and Start a Totaliser in Sub Type. From Selection Type choose either Multiple pens, Pen group or All Pens and select the relevant pen(s) below.
- **Digital Outputs -** Is an event effect that can switch a Digital Output On or Off. Enter which one in Sub Type and select the relevant relay output(s)
- **Alarm Acknowledge -** this is an effect of an event that can acknowledge a latched alarm on a Single Pen, Pen Group or All pens. Select the pen and the alarm. Select the pen and the number of alarm to be acknowledged.
- **Email –** Is an event effect that will send an Email when triggered by a Cause. Eg. Cause = Totaliser Starts, Effect = Email is sent.
  - **Sub Type -** Auto, Single Line User or Multiline User. Auto will enter what the Event was eg. Scheduled or Alarm triggered. Single Line User can have up to 69 characters of text or use *“Embedded Process Values” on page 100.* Multiline User can have up to 80 characters per line with up to 1000 characters including spaces, carriage returns and line feed. They can also include embedded process variable.
  - **Recipients -** Enter email recipients from the list. If no email recipients are present in the list, they must be entered first in the Email menu, see *“Email tab” on page 90.*
  - **Email Text -** Only available when Single Line User is selected as a Sub Type. Enter text here to add a Mark on Chart when the Email is sent.
  - **Email Template -** Only available when Multiline User is selected. These are sets of text scripts that can be pre-written and assigned to an Email. Select a template from the list. To set up templates for multiline text, see *“Email tab” on page 90.*
- **Screen Change-** (or Backlight On/Off) Select Screen Change as an effect to change the screen when triggered by a cause. Eg. Pen 1 goes into Alarm and the screen changes from a chart to a DPM screen where Alarm markers are visible. Or choose to have the **Backlight:** select On or Off. When the Event is triggered the effect is to turn the backlight to what state has been selected, On or Off.
- **Print Screen**– As an Effect, this will print the current process screen when triggered by a Cause. Eg. Cause = Digital turns on, Effect = Print Screen. To set up network printer information see *“Network Admin tab” on page 94.*
- **Counters-** Counters can be used as an Effect of an Event to count an occurence or to reset different types of counters. A User Counter must be set up first before it can be used as a part of an Event. *See “Counters” on page 105.*
  - **Enabled** - Tick to enable Event
  - **Type -** Counters
  - **Event Action -** Increment will add by whatever value is entered in “Increment By”. Reset will restart the counter to whatever number is entered in Reset To.
  - **Sub Type** - (only available when Reset is selected as the Event Action). Select to reset User, Pulse, Events, Digital Inputs, Relay Outputs or Alarm counters. Selecting any of these Sub-Types will activate the corresponding menu item(s) so you can then specify the number of the Sub-Type to be reset.

- **User Counters** - (only available when Sub-Type is set to User). Select the User Counter number to be used from the available list. Counters will only be available if they have first been set up in the User Counters Menu.
- **Increment By** - (only available when Increment is selected as the Event Action). Enter the number at which you want the counter to increment by when the event cause is triggered.
- **Reset To** - (only available when Reset is selected as the Event Action and Sub-Type is set to User). Enter the number at which you want the counter to reset to when the event cause is triggered.

- **Max Mins Reset** Use this as an effect of an event to reset all Max Min values.
- **Chart Control**- The chart activity can be controlled as an effect of an event. The chart control options are; Pause, Stop, Resume, Clear and Prefill
  - ***Pause*** *- this will pause the chart until it is resumed. Resuming a paused chart will display continuous chart data from when it had been paused. The chart can be stopped if in a paused state.*
  - ***Stop*** *- this will stop the chart and no chart data will be displayed for the length of time the chart is stopped. If a stopped chart is resumed there will be a gap in the displayed chart data.*
  - ***Resume*** *- this can be used after the chart has been stopped or paused. The chart data will continue from where it has been paused with no gaps displayed. But if the chart has been stopped the displayed data will display a gap in data until it is resumed*
  - ***Clear -*** *this will clear all the data being displayed. Data will not be cleared if the chart has been stopped*
  - ***Prefill*** *- this will clear the chart and then fill it with the current reading.*
- **Clear All Messages** - this will clear all the messages in the message list.
- **Delayed Event -** This will allow one event to trigger one or more other events after a specified period of time. The time period can be set in seconds from 1 to 3600 (1 hour). Select Delayed Event and select the event(s) this will apply to. Enter the time delay.
- **Script Timerst -** Script timers provide 20 independent timers to be used as desired, previously control and access of script timers was limited to maths functions for use in script but this has now been extended allowing the timers to be controlled using the event system, allowing them to be stopped, started and reset. Access to timers via the Maths scripting feature is still available, see *Figure 13.10, “Timers,” on page 269.*
- **Play Sound -** Sound effects can be used to alert the user that an event effect has occurred. Set the Sub Type to Start to reveal two more menu options, Sound name and Play Mode. The user can pick from a list of 20 different sounds these can be configured to play a single time or repeat continuously. Please be aware that continuous mode will repeat continuously until a corresponding “stop” event is triggered for that sound. Also like ring tones the sounds themselves can be replaced on the recorder with custom sounds. To add sounds refer to the Recorder User manual.
- **Display Alert** - Display alert as an event effect – this feature is available from within the event system where the Alert Display can be used as an event effect to display a preset or user defined marker. Select Message Type as Preset to display a list of all available markers that have been previously added to the recorder. To add Preset Markers go to *“Preset Markers” on page 105*. Select the Message Type as User Defined to enter your own text. For more information on the Alert system and how to customise it see *“Error Alert tab” on page 64*.
- **Batch-** Batch controls can be used as the effect of an event occurring. An event cause must be set up so that the effect of the event is to Start, Stop or Pause a batch. Batches work using groups of pens so when setting up an event with a batch control as a cause you must assign a group of pens. *See “Groups tab” on page 59*.

- **Reports -** A report can be created as an effect of an event. Reports can be generated on a periodical basis using event system to show daily/weeks/monthly totals, max mins, averages etc. the reports can be printed, e-mailed as attachments or exported to external media. Before a report can be run the report details must be entered in *"Reports" on page 113.*

- **Update Tabular Readings** - Triggering this event causes the tabular display to update and show the latest set of readings.

- **Enter Replay Screen -** An event can be set so that the effect is to change the screen to enter the Replay Screen.

- **Exit Replay Screen -** An event can be set so that the effect is to change the screen so that the recorder will Exit the Replay Screen.

- **Change Chart Speed -** An event can be set so that the effect is to change the Change Chart Speed. The speed of the chart can be set in the Sub Type section for Fast (6000mm/h), Medium (120mm/h) or Slow (10mm/h). When that event gets triggered, selected chart speed will be set to the current active screen.

Counters

Up to 16 User Counters are available and can be used as a part of the Events system. User Counters can be set up as a Cause or an Effect of an Event.

Setup a User Counter

Select the next available Counter number.

- **Enabled -** In the Counter # menu tick to Enable.

- **Name -** Name the counter for ease of identification.

- **Start At -** Enter the number at which you want the counter so Start At

- **Rollover At-** Enter the number at which you want the counter to Rollover At. The default maximum Rollover value is 3.3e+38.

Once a User Counter is setup it has to be assigned something to count eg. as a part as an Event. See *"Events tab" on page 95*.

Preset Markers

Set up marker text that can be used to mark the chart as a part of an Event Effect or manual added from the process screen as a Mark on Chart.

The mark on chart functionality has been extended to include the use of 20 separate preset markers. With some markers configured when using mark on chart the user has the option of starting with blank text, the previously entered text or one of the preset markers. Preset markers are also used in the Mark on chart effect and the Alert system effect. *See "Error Alert tab" on page 64.*

To add text to a marker, select the next available marker and enter the text via the on screen keypad.

Time Sync

This provides Time Synchronisation on recorders on a Digital Input.

- **Enabled -** Select the tick to enable Time Sync.
- **Trigger -** When recorder receives the Digital Input and there is a state change, i.e. On or OFF, then the recorder time will be synchronized to the nearest hour.
- **Digital Input** - only on Digital Input configured as pulse input. Choice the input pulse through one of the channels supported (1 to 4). Time sync will only happen on the configured channel when digital input is received on that configured channel.
- **Sync time** - this defaults to synchronise the time every hour.

Once the time synchronization is complete, message will be send in the system messages to show time changed on digital input. This will notify the user that system time has been synchronized to the nearest hour due to digital input.

Screen

- **Screen tab-** ***Brightness Control*** and ***Screen Saver Settings***
- **Charts tab-** Set up the chart speeds in three categories; ***Fast, Medium*** and ***Slow***

Screen tab

Setup the recorder's screen configuration.

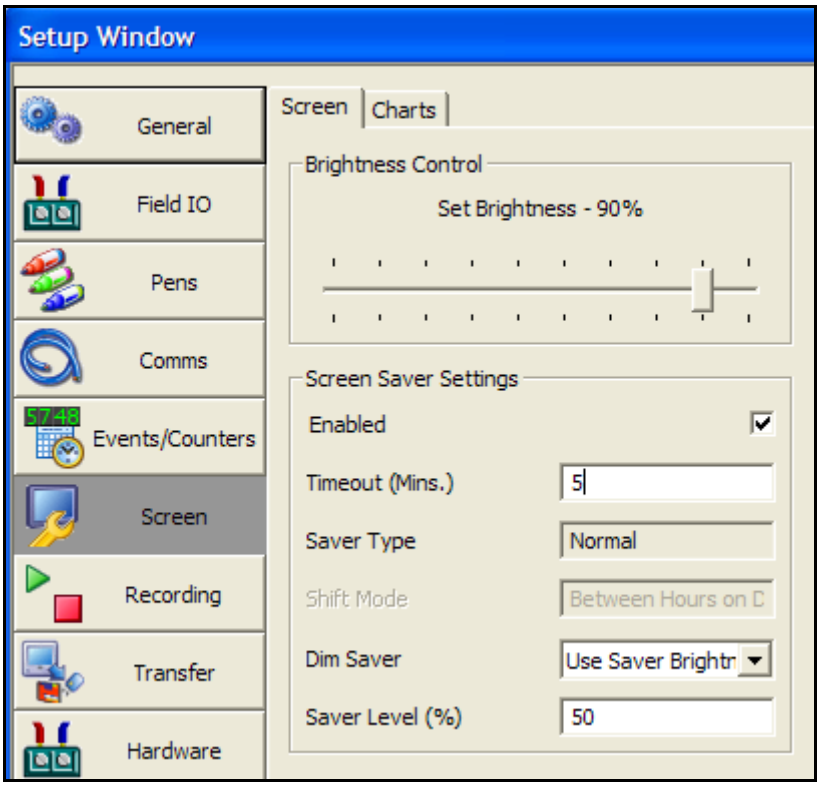
Brightness Control

Adjust the brightness of the screen using the instant brightness slider. Default screen brightness is 80%. Adjustable between 10% and 100% of full brightness. Move the slider to adjust the brightness.

Screen Saver Settings

Configure the screen display and ***Screen Saver*** functions. The default state for the Screen Saver is disabled. The Screen Saver function helps to reduce backlight wear. When active, the back light is off and nothing on the display is visible. The screen saver will not function in Setup Menus or in test mode.

- **Enabled** - Tick to enable
- **Timeout (Mins)** - Only available when the Screen Saver function is active. This is how long the Screen Saver will display on the screen. Programmable between 1 and 720 minutes in software, when disabled the screen will remain on permanently (enter 0 to disable).
- **Saver Type** - Only available when the Screen Saver function is active. This is set to Normal.



- **DimSaver** - Only available when the Screen Saver function is active. ***Dim Saver*** will help to increase the life of the backlight and lower the screen brightness for night time use. ***Use Saver Brightness*** or ***Off Always***.

- **Saver Level** - Only available when the Dim Saver function is set to ***Use Saver Brightness***. Select this to use the instant dimming slider which lowers the screen brightness. Default screen brightness is 80%. Adjustable between 10% and 100% of full brightness. This works on a square law rule that means if you reduce the saver level by 25% you will double the backlight life. If you reduce the saver level by 50% you will quadruple the backlight life.

Exit Screen Saver

If the screen saver is active on the recorder, any of the following will deactivate the screen saver.

- User touches the recorder screen.

- Any USB device is plugged in or unplugged.

- On alarm - An alarm is triggered, the unit will not return to screen saver till the alarm state is inactive and another screen saver time-out period has expired.

Charts tab

A ***Chart speed*** is the time it takes the data to travel from one side of the screen to the other. The recorder has up to 10 different chart speeds. There are 3 categories that can be set; ***Slow, Medium*** and ***Fast*** (default). Set up each category to display the desired chart speed.

- **Fast Speed** – 60mm/h, 120mm/h, 300mm/h, 600mm/h 1200mm/h and 6000mm/h
- **Medium Speed** - 10mm/h, 20mm/h, 30mm/hr, 60mm/hr and 120mm/h
- **Slow Speed** – 1mm/h, 5mm/h and 10mm/h, 20mm/h

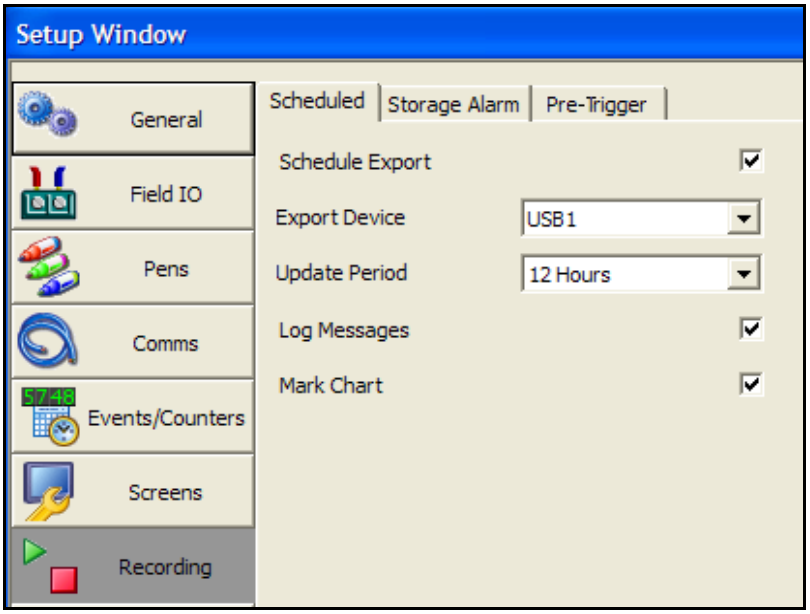
Once the charts speeds have been set up in this menu go to a process screen displaying data on a chart and touch the screen. This will activate the Settings menu in the top right of the screen, select this to display the 3 categories set.

Recording tab

Scheduled

Use this screen to set up a scheduled export of data

- **Schedule Export** - Tick to enable.
- **Export Device -** Select the device you wish to export data to. USB1 is the first USB device to be fitted and USB2 is the second one fitted, front or rear of the recorder. Compact Flash not available for the **QXe** and the rear USB port is only available as an option. For **GR2 and GR3** recorder configuration via front SD card is supported.
- **Update Period -** Select how often you wish data to be exported from the list provided, 10 minutes to 24 hours.
- **Log Messages -** Tick to add a message to the messages list when a scheduled export has been performed
- **Mark Chart -** Only active when ***Log Messages*** is enabled. Tick to mark the chart when a scheduled export has been performed.



Storage Alarm

The storage alarm function is linked to the Error Alert system when there is a requirement for a time period to be set to alert the user before the storage media is full.

- **Internal memory -** Set the amount of time before the internal memory becomes full and data is lost and for the Error Alert Message to display on the screen. Enter a time period of between 0.5 and 48 hours.
- **Export media** - Set the amount of time before the data being exported to a media becomes full, and data is lost, for the Error Alert Message to display on the screen. Enter a time period of between 0.5 and 48 hours.
- **FTP Memory -** Set the amount of time before the FTP memory becomes full, and data is lost, for the Error Alert Message to display on the screen. Enter a time period of between 0.5 and 48 hours.

Pre-Trigger

The pre-trigger functionality function captures a high resolution trend leading up to an event triggered by an alarm, and optionally after the event (Post-Trigger), where the information can then be viewed in **Trend Manager** for analysis.

Configuration

The pre-trigger system is simply configured by selecting which pens they wish to be included in the pre-trigger by enabling the Pre-Trigger item in the pen logging menu, see *"Logging tab" on page 79*, and setting the desired pre-trigger time which is common to all pens, this is done here in the recording menu.

- **Pre-Trigger Time** -The pre-trigger system can be configured to allow between 1 and 10 minutes at whole minute increments of pre-trigger data to be stored for each pen, each pen will store the same time span. The default will be set to 5 minutes.
- **Post-Trigger Time** - specified in seconds from 0 (disabled and the default) to 3600 for 1 hour of post trigger time, extending the alarm log rate for all pre-trigger pens by the specified time after the last pre-trigger pen alarm has cleared.

Acquiring

In the running state the pre-trigger buffers are being filled with pen readings dependant on the alarm logging rate when no pre-trigger pen alarms are asserted. The buffer will cycle when they reach the maximum pre-trigger time as configured.

If power is lost when the pre-trigger is acquiring then the pre trigger information will be lost.

Event processing

All pens enabled for pre-trigger will be put into their alarm logging rate and remain in the alarm logging rate while any pre-trigger pen alarm is asserted.

Once one or more alarms on a pre-trigger enabled pen(s) fire, the readings in the pre-triggered buffers will be saved to internal flash memory. The pre-trigger system will request an export to be performed if scheduled export is enabled. If Post trigger is enabled, the alarm log rate will continue for this period after all alarms have cleared.

If during the post trigger time a pre-trigger alarm re-occurs, but the previous pre-trigger event has not been exported then the post trigger timer will be reset and will start again after all pre-trigger alarm have cleared.

Pre trigger information is only secure when it has been saved into the internal flash memory or exported. If the power fails before the Pre-Trigger alarm is activated data will be lost and the recorder will restart.

Export

The pre-trigger files are exported from the internal flash memory via the scheduled or manual export to the externally selected device, OR when an FTP download occurs. The pre-trigger data is appended to the Pen data files during export. It is recommended to set up a scheduled export as the pre-trigger files will only be exported once and to the first device on which an export occurs following a pre trigger event occurring.

If power fails when the pre-trigger information is waiting to be exported or is being exported, then the system will restart into the export state, allowing the files to be exported.

Restart

Once the files for a pre-trigger have been exported and all alarms on pre-trigger enabled pens have cleared, the pre-trigger buffers are reset and the existing pre-trigger information has been exported, then the system returns to the acquiring state.

If a configuration change is performed then the pre-trigger system will be restarted, the user will be warned before committing that they will restart the pre-trigger buffering, if an export is pending they will also be asked to perform the export procedure or lose the existing pre-trigger information.

Importing

Once exported the import into **Trend Manager** can be performed from removable media or via FTP, the imported information will show the pre-trigger pens as overlapped data, this will automatically be displayed utilising the **Trend Manager** overlapped pens feature to clearly show the pre-trigger data.
See “Pre-Trigger Data” on page 208.

Transfer

This is where the Setup configuration can be imported from a recorder or exported to other recorders via removable media. Click on the Transfer button and select either Import or Export.

To import a setup enter the location from where the imported setup file is to be extracted from in the Path box or use the Browse button to search for the location of the setup file to be imported.

To export a setup enter the location to where the setup is to be exported to in the Path box, or use the Browse button to search for the location for the setup file to be exported to.

If importing data from removable media eg. USB key, SD memory card or Compact Flash card, and there are multiple sub directories (one for each recorder), point at a specific sub-directory to import just that recorder or the root to import all the recorders. Choose a folder to import from or export to.

Compact Flash is not available on the **QXe**. SD Card is not available on the **GR1**

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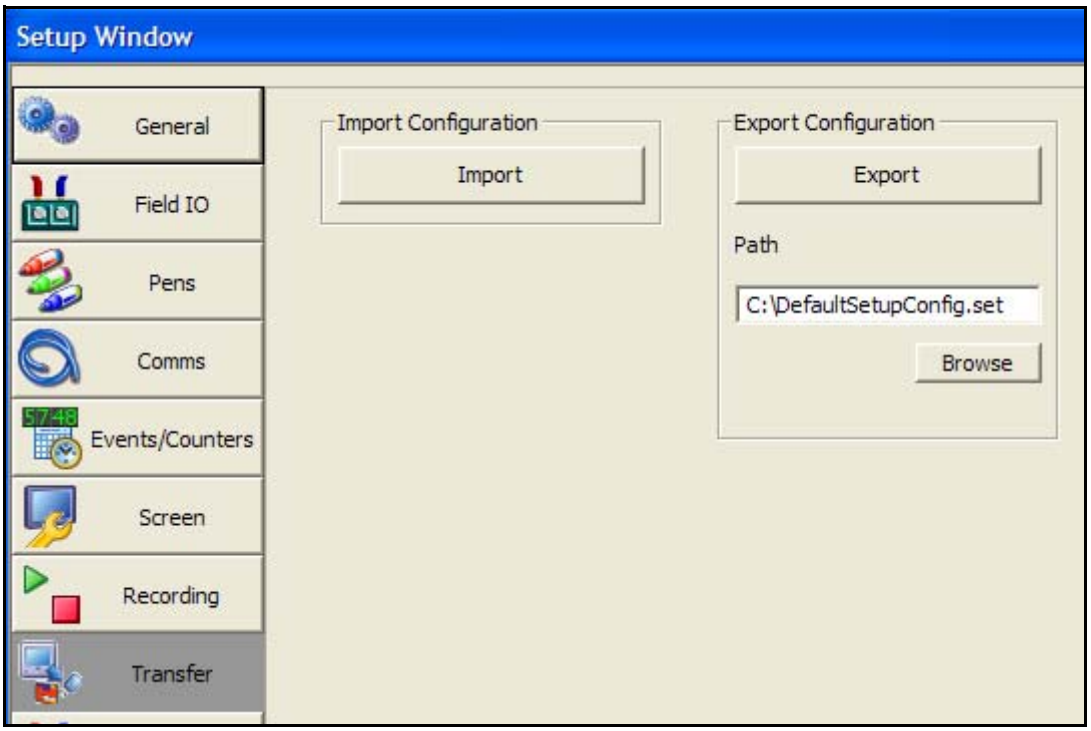
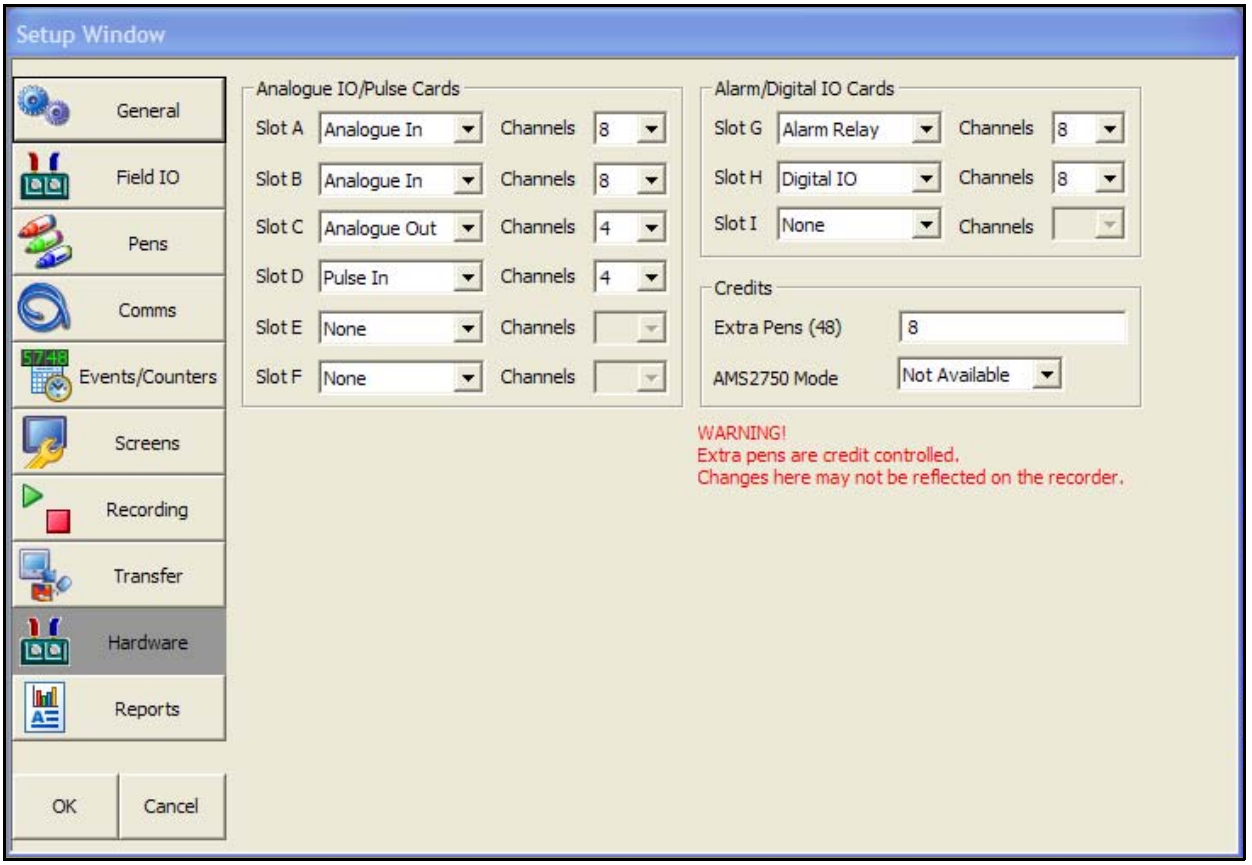


Hardware

The Hardware window displays the current hardware status of the recorder. If the recorder hardware is changed and new cards are added or removed or moved position then this screen should be updated to reflect the new changes.

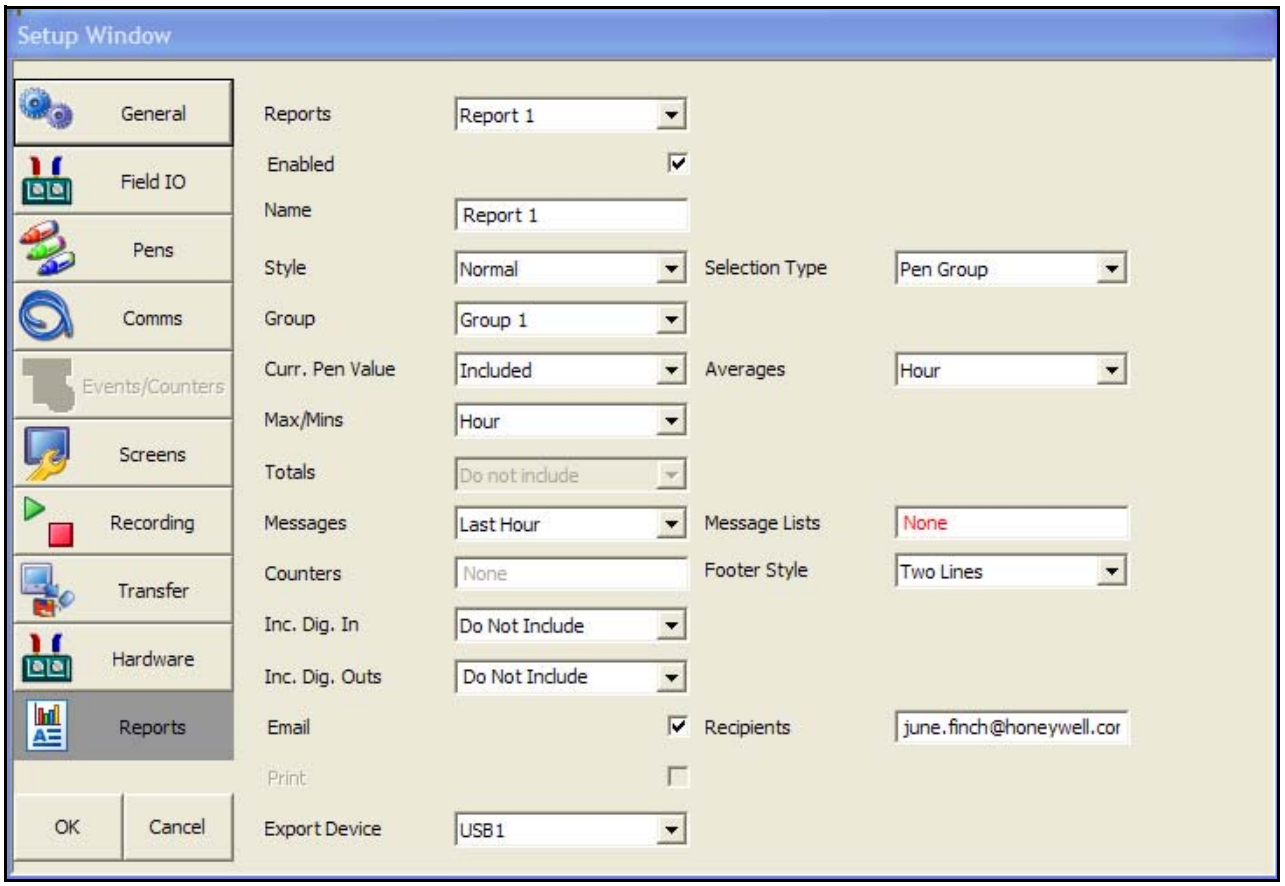
For example; when adding or removing options cards such as an Relay Alarm card, Digital IO card, Analogue Out or Pulse card. (Analogue Out and Pulse In cards are not available on the **QXe, GR1**)



Reports

Reports can be generated manually or on a periodic basis using the event system to show daily/weekly/monthly totals, max mins, averages etc., the reports can be printed, e-mailed as attachments or exported to the external media. The reports will be in RTF format for use in MS Word or other compatible word processors.

Before a report can be run the report menu must be configured here.



In the Reports Menu select the first or next available Report #.

Enabled - Set to a tick to enable

Name - Enter an identifiable name of your report

Style - Select Batch for running reports on current batches. Select Normal to run reports on specific pens, all pens or groups. A TUS report is for a Temperature Uniformity Survey that can only be used if this option is enabled in the credits menu.
This type of TUS report is condensed and should not be used as the final report to comply with AMS2750 specifications. The full report for a TUS should be generated using the TUS procedure, refer to the User manual.

Selection Type - This will be set to Group if Batch is selected for the Style, select which group of pens the report will be run on. If the Style is set to Normal the following options will be available:

- **Multiple Pens -** This allows you to select which pens to run a report on including Totaliser pens
- **Pen Group -** Allows you to select which group of pens to run a report on
- **All Pens -** This will run a report on all the currently enabled pens

Group - (only available when Pen Group is selected for Selection Type). Select the Pen Group you wish to run a report on from the available groups list. To have groups of pens available in this list, individual pens must be allocated to a group, see Group in the *"Pens tab" on page 58*. Use Group to produce an AMS2750 summary report.

Current Pen Value - Select whether to include the Current Pen Values, of enabled pens, in your report.

Averages - Select this to include the Average values of each selected pen, All pens or group of pens depending what has been chosen in the Selection Type option. The report can give you the pen Average value for every Hour, Day, Week, Month, the Current average pen value or Do Not Include Average values.

Max/Mins - Select this to include the Maximum and Minimum values of each selected pen, All pens or Group of pens depending what has been chosen in the Selection Type option. The report can give you the pen Max/Min value for every Hour, Day, Week, Month, the Current max/min pen value or Do Not Include Max/Min values.

Pens - (only available when either Curent Pen Value or Max/Mins is set to Included). Select which pens this report will be run on

Totals - Select this to include the Total values of each selected pen, All pens or group of pens depending what has been chosen in the Selection Type option. The report can give you the pen Total value for every Hour, Day, Week, Month, the Current total pen value or Do Not Include Total values.

Totaliser Pens - (only available when Multiple Pens is selected for Selection Type). This will display any pens that have been set up as a totaliser pen.

Messages - Select this to include the Messages of each selected pen, All pens or group of pens depending what has been chosen in the Selection Type option. The report can give you the pen Messages for the Last Hour, Last Day, Last Week, Last Month, All messages or Do Not Include Messages.

Message Lists - (only available when batch is selected in Style). Select which type of messages are required for your report: Alarm, System, Diagnostic, Security or User messages. One or more selections can be made.

Counters - Select which type of Counters are required for your report: Alarm, User, Event, Digital, Digital Input, Relay Output or Pulse. One or more selections can be made. For more information see *"Counters" on page 105*

Footer Style - Choose between one or two lines of footer at the end of the report.

Include Digital Inputs - Select to Include or Do Not Include this option.

Include Digital Outputs - Select to Include or Do Not Include this option.

Email - Tick to enable the Email function.

Recipients - (only available when the Email function has been enabled). Select from a list of email recipients. Email addresses and Server names must be entered in *"Email tab" on page 90.*

Print - Set to a tick to enable the Print function. The printer settings must be set up before this feature will operate, see *"Printer tab" on page 62.*

Export Device - Select from a list of options if you require your report to be exported to an external media device or select Do not export. The removable media device needs to be fitted to the recorder when the report is run and have enough memory available.

Run a Report

Once the report details have been completed in the report menu you can run your report either manually or by using the Event system.

- For a manual report see "Reports (Process)" in the User manual
- For a report triggered using the Event system see *"Event Effects" on page 100*.

Pen Report Information

Currently pens provide real-time values, max, min and totals. Reports need some history of these values to be maintained, so a set of period based data is maintained. The periods being an hour, day, week and month. The recorder builds up the current hour, day, week and monthly data and keeps the previous (completed) hour, day, week and month stored.

At anytime it is possible to access the current hour, day, week or month for Max, Min, Average and Totals, also you can get access to the previously complete whole hour, day, week or month for each pen.

- An hour is a whole hour starting on the hour eg. 10.00 to 11.00
- A day starts at one second passed midnight.
- A week starts one second passed midnight on Sunday
- A month starts at one second passed midnight on the 1st of the month

Access to this is provided automatically via reports but this information can also be included in maths/scripts and by using embedded variables.

Pen Report Maths

In maths the following syntax is available:

prmax[x,y,z] = Pen report Max value

prmin[x,y,z] = Pen report Min value

prave[x,y,z] = Pen report Average value

prtot[x,y,z] = Pen report Totaliser value

where ...

x = Pen Number 1 to 96
y = period 1 = Hour, 2 = Day, 3 = Week, 4 = Month,
z = report set 1 = Current, 2 = Previous completed

e.g. **P1 =prmax[23,2,1]** - Max value so far for current day for Pen 23

Pen Report Syntax

the syntax for the embedded variables is as follows:

[[PRPtttxynn.v]]

ttt is the type of variables required and can be

MAX = Max value

MAT = Time max value was recorded

MIN = Min Value

MIT = Time min value was recorded

AVE = Average Value

TOT = Totaliser value

STM = Start time of the reports set

x is the report set and can be

C = Current working hour, day, week, month

L = Last completed hour, day, week, month

y is the period and can be

H = Hour

D = Day

W = Week

M = Month

nn is the pen number from 1 to 96

e.g. of some embedded variables

[[PRPTOTLM1.v]] Total for last complete month for pen 1

[[PRPMAXCD23.v]] Max so far for current day for pen 23

[[PRPMATCD23.v]] Time max was recorded for current day for P23

[[PRPSTMCD23.v]] Start time of report for current day for pen 23

Recorder configuration complete

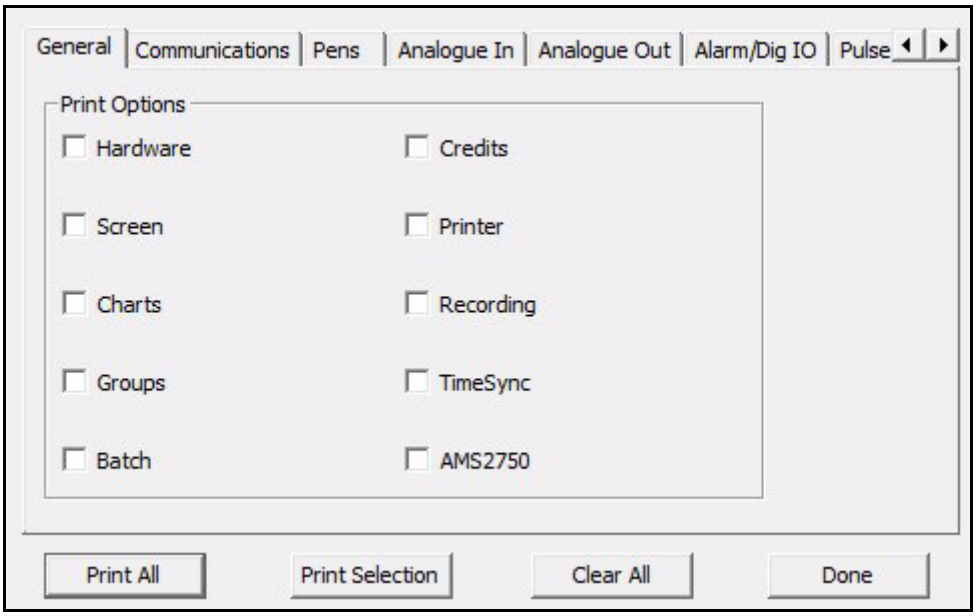
When all setups are complete press OK, a prompt to save will only appear if changes have been made in the setup window.

For Peer communications and Batch settings, see *"Peer Services" on page 118* and *"Batch Settings" on page 118.*

Printing Setups

Select the recorder button on the left and right click on the recorder containing the setup required to be printed. Select the Print button and choose the setup required and press OK.
From the Select Print Option box select Print Setup. To print an IQOQ report see *"Appendix H - IQOQ Protocol Document" on page 305.*

- Go through each tab and select the boxes required to produce a printout of the setup.
- Click Done when each tab is finished and Print when all tabs are completed.

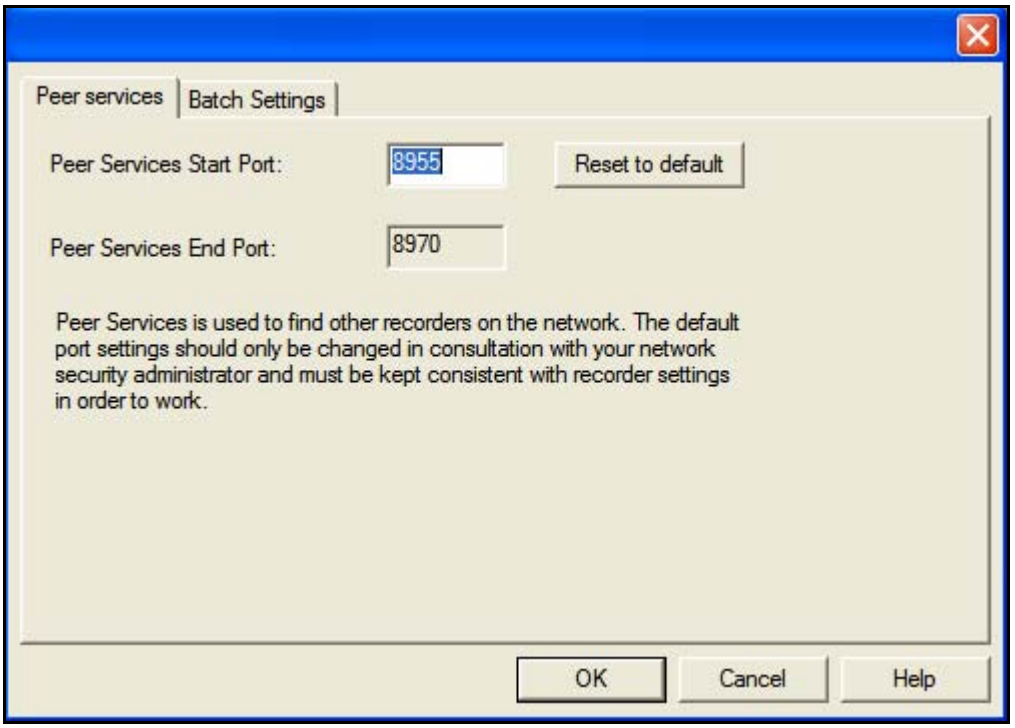


NB. Full recorder configuration can take up many pages. If this is required, select Landscape mode to cut down the page count. The Font type can be changed if desired.

- **Print All** - This will select all the areas shown and print them
- **Print Selection** - Select the areas to print
- **Clear All** - This will clear all print selections
- **Done** - Hit this to cancel this screen or when you are finished printing

Peer Services

In the top left will be an Edit button that takes you to Preferences. Select Preferences to produce the Peer Services dialog and the Batch Settings dialog. .


Peer services
Batch Settings
Peer Services Start Port:
8955
Reset to default
Peer Services End Port:
8970
Peer Services is used to find other recorders on the network. The default port settings should only be changed in consultation with your network security administrator and must be kept consistent with recorder settings in order to work.
OK
Cancel
Help

Peers services is used to find other recorders on the network. The default port settings should only be changed in consultation with your network security administrator and must be kept consistent with recorder settings in order to work.

- **Start Port -** Default port number 8955
- **End Port -** Default port number 8970

Batch Settings

Concurrent Batch Mode

Batch mode has changed to allow concurrent batches, where each batch is associated with a group, so all pens within Group 1 will belong to the batch that is controlled by Group 1. Screens can now be set to display groups, in this mode only messages associated with that group (i.e. pens within that group, or batch messages for that group) will be shown on the chart.

Remember when you have set up your batch requirements you need to assign pens to the batch group.

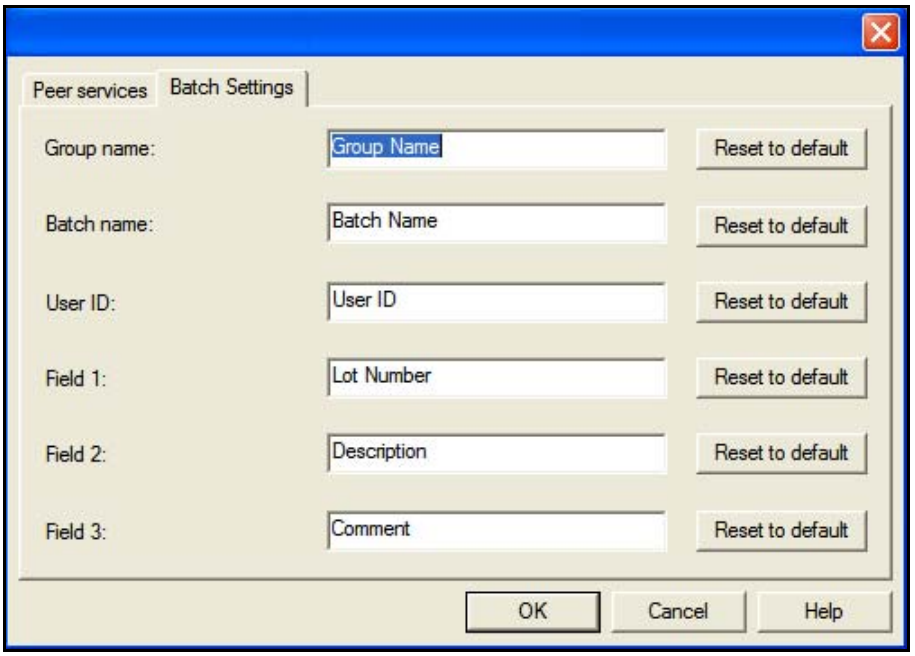
- **Group name:** Enter the group name for the batch run
- **Batch name:** Enter the name of the batch name and setup a list of additional names to appear as a pick list as a part of the Batch Control screen.

- **User ID:** Enable this to make this a requirement when starting a new batch. The User ID display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. If Passwords are active on the recorder then the User ID page will be skipped for user entry and the name of the person logged in through the password system will be automatically entered.

- **Field 1:** Defaults to Lot. Enable this to make this a requirement when starting a new batch. The Lot number display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. The addition list names will not appear in a drop down list in the Batch Control screen unless you enable Show “n” List in the group properties menu.

- **Field 2:** Defaults to Description. Enable this to make this a requirement when starting a new batch. The Description display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. The addition list names will not appear in a drop down list in the Batch Control screen unless you enable Show “n” List in the group properties menu

- **Field 3:** Defaults to Comment. Enable this to make this a requirement when starting a new batch. The Comment display name can be renamed and a list of additional names can be setup to appear as a pick list during the Batch Control setup. The addition list names will not appear in a drop down list in the Batch Control screen unless you enable Show “n” List in the group properties menu.



NOTICE

List driven data fields – The next 5 fields are available for data entry associated with a batch. The names can be overridden to suite the end user application, all fields are now 69 character long with the exception of the User ID which is 32. A pre-defined list of up to 30 items can be configured to allow users to select input for these fields from a list rather than type them in every time. E.g. a user might have 8 different products running though the same process, these can be pre-configured so when starting a batch the user can pick from a list of products. The pre-defined lists have to be enabled in the individual group screen, eg. Show *** List.

Graph Settings

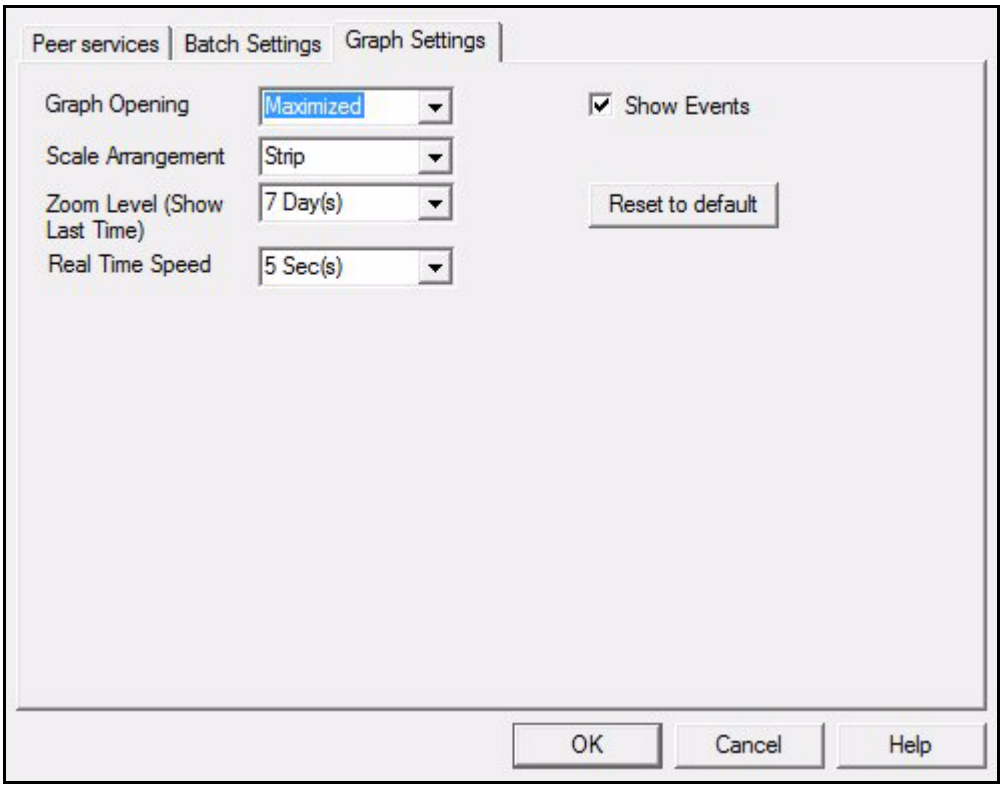
Use this screen to set the configuration for new graphs.

In TrendServer Pro, Go To Edit->Preference, Trend Server Pro Dialog will open.

Select Tab “Graph Settings”

Change the settings in “Graph Settings” for new Graph.

Click “OK”



Graph Opening: Options available for graph openings are 1) Maximized 2) Normal 3) Minimized. New graph default setting is set to Maximize all the graph.

Scale Arrangement: This acts in the same way as the “Arrange” Button in any Graph. Options available for Scale Arrangements are 1)Tile 2) Strip 3) Best Fit 4) Minimize Scale and 5) Default.

Scale arrangement will operate as given below:

- drag single pen into newly created graph then scale will rearrange again.
- to change the default preference(as shown in figure above) in between adding pen on the graph, the scale will rearrange with new preference. E.g. created new graph with as Tile as default scale arrangement in Graph Settings as shown in above figure. Add Pen 1 and Pen 2 to graph. Both scale will arrange them self into Tile view. Now, change the default preference to Stretch and added pen 3 to graph then all three pens (i.e. Pen 1 , Pen 2 and Pen 3) rearrange themselves to Stretch scale view.
- manually change the scale setting from scale arrangement option for any Graph opened, then these Default settings (as shown in figure above) will not be applied on pens which are added afterwards.

Show Events: Yes or No, For Showing events.

Zoom Level: Show Last X hours. Parameters are 1Min, 5Min, 15Min, 30Min, 1Hour, 2 Hour, 6 Hour, 12Hour, 1Day, 5Day 7Day(default) and All) It shows data of specific duration in a graph.

Real Time Speed: Setting speed for real time charting the graph. Options provided are 1 Seconds, 2 Seconds, 5 Seconds, 10 Seconds, 1 Minutes, 2 Minutes, 5 Minutes and 1 Hour.

Reset to Default: will reset all settings to default.

100mm & 180mm Recorders

Trend Analysis Software allows you to set up a recorder from your PC.

NB. If any function is denied by a flashing padlock, this is because a password is required to be entered to proceed any further, see *"Passwords" on page 173.*

All areas are covered in the ***Trend Analysis Software* Help.** Click in any area on the screen and press F1 on the keyboard to display the related help files.

NOTE: 100mm & 180mm Recorders are not supported for the Archived Databases in Archive Database Server.

Start here

With the software open, the main screen will be blank with a tool bar down the left hand side. To start recorder configuration first select the ***Recorder button*** on the button bar down the left side of the screen.

Add New Recorder

To add a recorder select the recorder icon from the button bar down the left side, select ***Add New Recorder*** and follow the on screen instructions to confirm the new device being loaded. In the ***Hardware Configuration Wizard***, enter the recorder details including the ID number. The ID number of the unit must be set by the user. It is important that all of the user's recorders have different ID numbers especially if ***Comms*** is being used.

Hardware Configuration Wizard for the 100mm thumb recorder

FIGURE 6.4 Hardware Wizard

Slots A and B are for analogue inputs, select either Universal, Fast Scanning, Linear and Output cards depending on what options are fitted into the recorder. When the analogue input cards are selected,

ensure the corresponding number of channels is displayed in the associated box on the Hardware Configuration Wizard.

Slot C is for the Communications card, choose either Ethernet, RS485 Trendbus or RS232. The associated comms box will show further options for the type on communication selected.

Slot D is for the alarm card, this is an option card so check to see if this is included in your recorder. If so select Alarm and remember to set the number of channels in the associated box.

VPens or Virtual pens are available with each type of recorder. These virtual pens are used mainly for displaying maths functions and the totaliser. A virtual pen can also be setup as an identical copy of a pen if the data from one pen is required to be written to two drives. Only one pen can write to one drive. Additional pens can be purchased upon request.

Finally, confirm if your recorder has a PC-Card fitted (PCMCIA), see *"PCMCIA Interface Card" on page 123.*

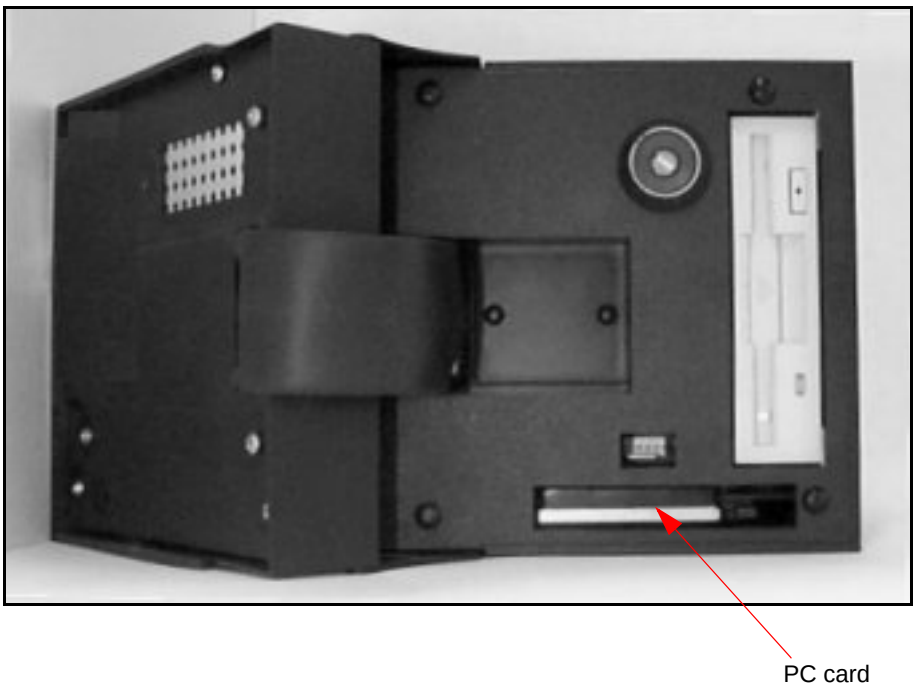
PCMCIA Interface Card

(100mm thumb Recorder)

This is a memory card interface, or hard drive, purchased as an option. It can be any size from an 8 MByte flash card to a 1 GByte hard drive.

This picture shows the ***100mm thumb recorder*** with a PC card fitted in the bottom slot below the disk drive. If there is no card fitted there will be a blanking plate fitted over the slot.

FIGURE 6.5 PCMCIA card slot



Hardware Configuration Wizard for the 180mm Recorder

FIGURE 6.6 Hardware Wizard

Slots A, B, A1 and B1 are for analogue inputs, select either Universal, Fast Scanning, Linear and Output cards depending on the options fitted into the recorder. When the analogue input cards are selected, ensure the corresponding number of channels is displayed in the associated box on the Hardware Configuration Wizard.

Slot C is for the Communications card, choose either Ethernet, RS485 Trendbus or RS232. The associated comms box will show further options for the type on communication selected.

Slot D is for the alarm card, this is an option card so check to see if this is included in your recorder. If so select Alarm and remember to set the number of channels in the associated box. Slot D2 is to fit an extra alarm card, do not use D1.

VPens or Virtual pens are available with each type of recorder. These virtual pens are used mainly for displaying maths functions and the totaliser. A virtual pen can also be setup as an identical copy if the data from one pen is required to be written to two drives. Usually only one pen can write to one drive. Additional pens can be purchased upon request.

Finally, confirm if your recorder has a PC-Card fitted (PCMCIA), see *"PCMCIA Interface Card" on page 123.*

All these areas are covered in the ***Trend Analysis Software* Help.** Click on any area on the screen and press F1 on the keyboard to display the related help files.

PCMCIA Interface Card

(180mm recorder)

This is a memory card interface, or hard drive interface, purchased as an option. It can be any size from an 8 MByte flash card to a 1 GByte hard drive.

This view shows the ***180mm recorder*** with the disk drive flap down revealing the disk drive and the PC card slot above it. If there is ***no*** PC card a blanking plate will cover the slot.

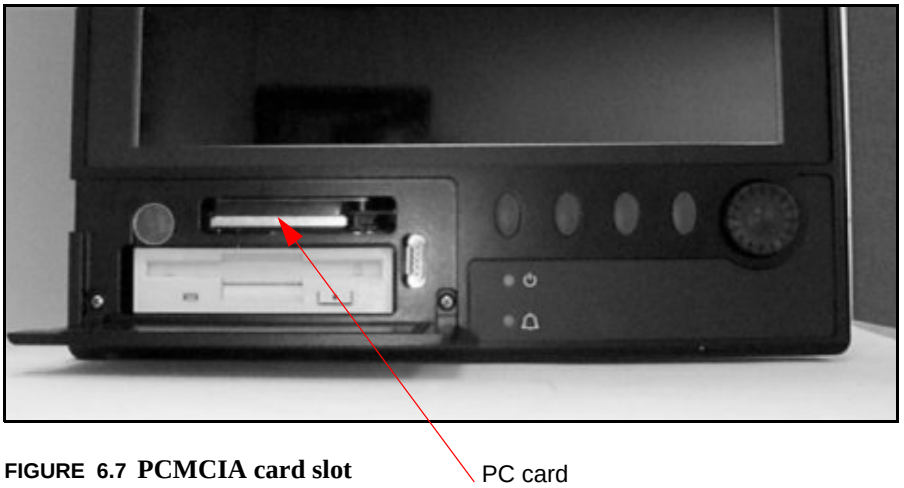
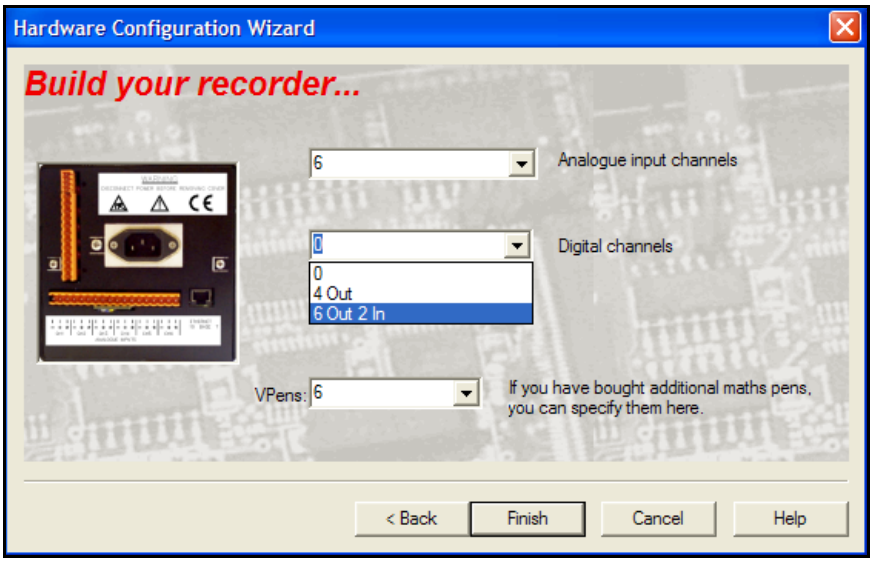


FIGURE 6.7 PCMCIA card slot

Hardware Configuration Wizard for the 100mm key recorder

FIGURE 6.8 Hardware Wizard



The ***100mm key recorder*** configuration only requires the number of analogue channels to be set, either 2, 4 or 6 inputs. The Digital channels box is available if the recorder has an alarm card fitted. The two alarm card options available are 4 relay output or 6 relay output with 2 digital inputs. Select the correct set up for the recorder and click on the Finish button.

Recorder Setup

General recorder setup

Go through each tab entering or editing the recorder details.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

General Setup tab

Check recorder details are correct.

Pen Summary tab

The ***Pen Summary*** tab shows the setup of each pen.

- **Pen:** Shows pen status.
- **Destination:** Data to be logged to Disk, PC card, Compact Flash/SD card or USB key.
- **Mode:** Normal or Alarm logging.
- **Log:** Normal, Continuous or Fuzzy types of logging.
- **Rate:** Specify the logging rate in days, hours, minutes, seconds or milliseconds.
- **Method:** Choose sample or min/max logging. Continuous logging only.
- **Units:** Units of measure for that pen.
- **% Use:** Percentage of disk space used, logging to disk or PC card.

This window displays the ***Disk Life Calculator*** which shows how much space is left based on the logging rate of the fastest pen. Readings are displayed in years, days, hours, minutes and seconds. This screen will update as pen details are completed. See next button ***'Pens'***.

Communications tab

For ***100 or 180 mm*** recorders with a comms card fitted, the correct comms card must be set up in the Hardware Configuration Wizard. *See "Add New Recorder" on page 122*

Only the Ethernet option is available on the ***100mm key recorder*** with directional key.

*Serial port RS232 (**100 or 180 mm** recorders)*

Not available on the ***100mm key recorder***.

For RS232 configuration, select either ***Front*** or ***Rear RS232 Port*** connections. Choose the type of ***Protocol*** required to transmit the data between computers or peripherals, either ASCII or None. For more information *See "Glossary" on page 251.*

Select the ***Baud Rate***, which is the speed at which the data will be transferred, default is 1200bits/sec. Enter how many ***Data bits*** per character, 5, 6, 7, or 8. Set the ***Parity*** to None, Odd or Even. The ***Stop bit*** signifies the end of the character, enter 1 or 2.

Serial port RS485

Not available on the ***100mm key recorder***.

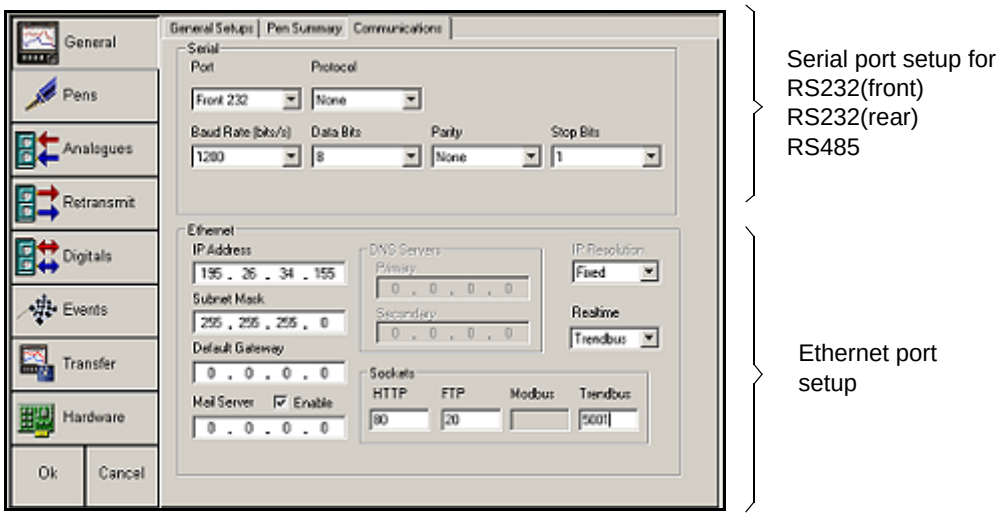
Select the RS485 port and what type of ***Protocol.*** The Baud rate is the speed at which the data is transferred, default is 38400bits/sec.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Ethernet Port

The ***Ethernet*** settings on this tab are only available if the unit has been configured for an Ethernet card. Enter the Ethernet information on the lower area of the comms tab. Refer to *"Appendix E - Ethernet & E-mail" on page 287* for more information.

example shown is for a ***100mm recorder*** (with thumbwheel) **FIGURE 6.9**



IP Address - This is to distinguish between the various devices connected to the internet when communicating using ***TCP/IP.*** The address is a 32 bit value normally displayed with four numbers separated by a full stop or period e.g. 195.26.34.186.
See your IT systems administrator for setting up IP addresses.

Subnet Mask - This acts like a filter when identifying an IP address. Specify the Mask that is used to determine the network address form the IP address, default is 255.255.255.0. Set this value according to the system or network to which the recorder or PC belongs.

Default Gateway - The ***Default Gateway*** is a configuration parameter transmitted to each network device. Set the value according to the system or network to which the recorder or PC belongs.

Mail Server - The ***Mail Server*** can only be selected if the E-mail option is available on the recorder. Enter the IP Address of the device to which the mail is to be sent, see *See "Event Email setup" on page 144* and *"Email tab" on page 90.*

IP Resolution - Uses different types of protocol to translate the IP Address, default is ***FIXED.***

Realtime - The drop down menu lists the protocol options for the retrieval of data via the Ethernet connection. Choose either ***None, Trendbus, Modbus TCP/IP, Modbus X. Modbus X*** differs from the standard Modbus only by the 4 byte floating point order being reversed for application compatibility.

Sockets - These numbers should not need to be changed, only by advanced users for networking.

All these areas are covered in the ***Trend Analysis Software*** **Help.** Click on any area on the screen and press F1 on the keyboard to access recorder specific help files. Also see *See "Glossary" on page 251.*

Pen related setups

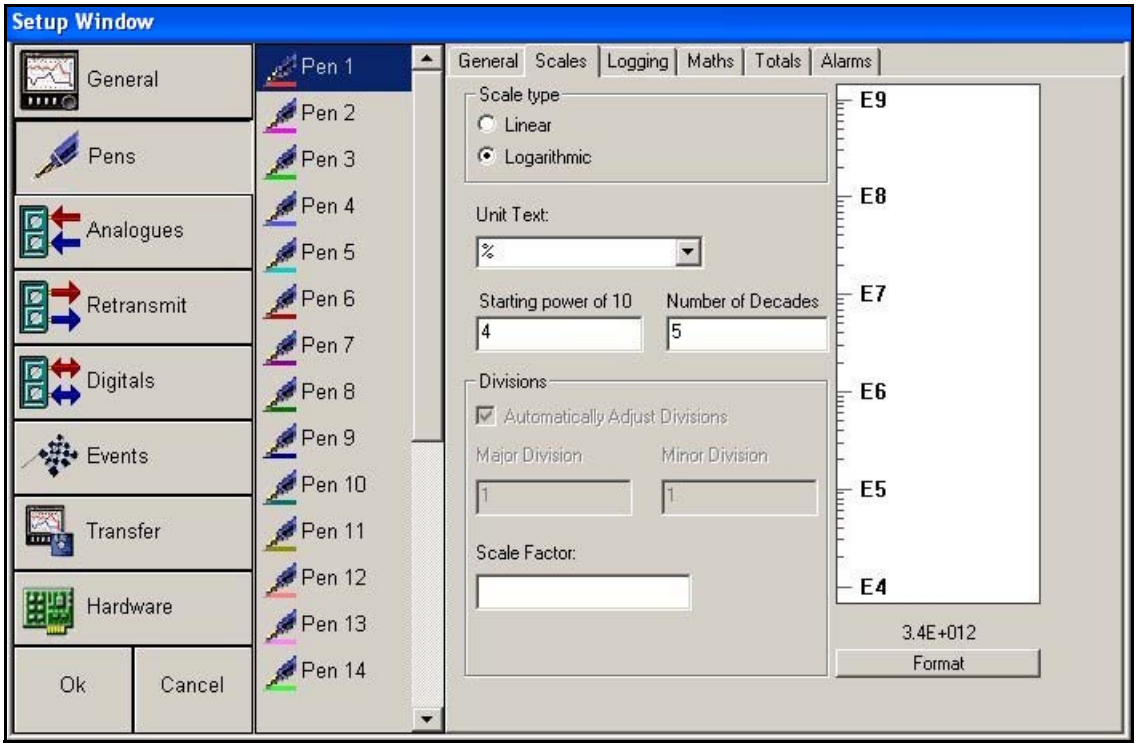
Select each pen from the list and allocate information about that pen by going through the tabs at the top of the screen.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

General

In the ***General*** tab select and enable each pen required, allocate a name or tag and a description. There is an option to set the pen trace thickness and a comprehensive colour palette to modify the pen trace colours on the graph. The pen trace colours are identical to those in the recorder.

Scales



Scale Type

Scale Type is for either a ***Linear*** or ***Logarithmic*** scale. When either of these are selected some of the headings will change on the Scales tab to suit each option.

Unit Text

Enter information about the scale by filling in the unit of measurement from the ***Unit Text*** drop down menu, or entry the text or symbol manually.

For a linear scale set the ***Zero*** and ***Span*** details for the bottom and top scale limits, which can be up to 7 digits in length. The scale displayed in this window will incorporate zero, span and division changes according to information entered. For a logarithmic scale the headings will read ***Starting power of 10*** eg. 4 will represent 10 to the power of 4. The other piece of information required for a log scale is the ***Number of Decades*** which is limited to a maximum of 9 decades. A negative scale cannot be entered for a Log scale.

Divisions

The ***Divisions*** within the scale will be automatically worked out and entered by the software depending on the scale limits. Un-tick this box and divisions can be manually entered for both ***Major*** and ***Minor*** divisions. (not available for Logarithmic scales)

Scale Factor is for user entered text that displays on the scale if required. Used for displaying scales with large values eg. if you have a scale that is 0 to 10,000 you can display it as 0 to 1000 with a scale factor of x10. There is no change to the scale shown in the tab.

Format

The ***Format*** button defaults to automatic scale labelling or select ***Specify*** to define the number of decimal places.

Logging

When enabled, set the ***Logging Mode*** to Normal or Alarm. Alarm is the logging rate for this pen when it goes into an alarm state. Select which removable media the data is to ***Log To***. If the ***Logging type*** is set to None, logging will be disabled. Choose between Continuous logging or Fuzzy logging. For more details see *See "Fuzzy Logging" on page 129.*

The ***Logging Rate*** is available for Continuous logging only. Specific intervals can be fixed using the ***Concise*** option. There are three ***Logging methods*** to choose from ***Sample***, ***Average*** or ***MaxMin***. ***Sample*** will log the actual value of the last sampled reading, ***Average*** will take an average of all the samples taken since the last log, and ***MaxMin*** will log the Maximum and Minimum values since the last log.

Fuzzy Logging

Fuzzy Logging has been developed as a secure data storage technique which has self teaching data storage algorithm so the recorder stores data at a variable rate to match the process being monitored.

For more information see *See "Appendix C- Fuzzy Logging" on page 279*.

When ***Fuzzy Logging*** is selected the set up screen will change. A ***Base Sample Rate*** is required, this is the rate at which the Input signal is checked. Specific intervals for logging can be fixed using the concise button.

To keep logging to a minimum, optimise disk space and to have more accurate waveforms, tick the ***Autofit*** box.

Advanced Users Only

Fine tuning - Band A. Set up a percentage by which the input signal must change to trigger a log.

Band B is a more specific band within Band A, to give a more accurate trace.

Maths

If the maths pen option has been purchased the recorder can be configured to carry out simple or complex calculations. Configuring the maths block is easier than it looks. Type the formula you require as you would write it. The formula(s) can include analogue inputs, digital inputs and relay outputs.

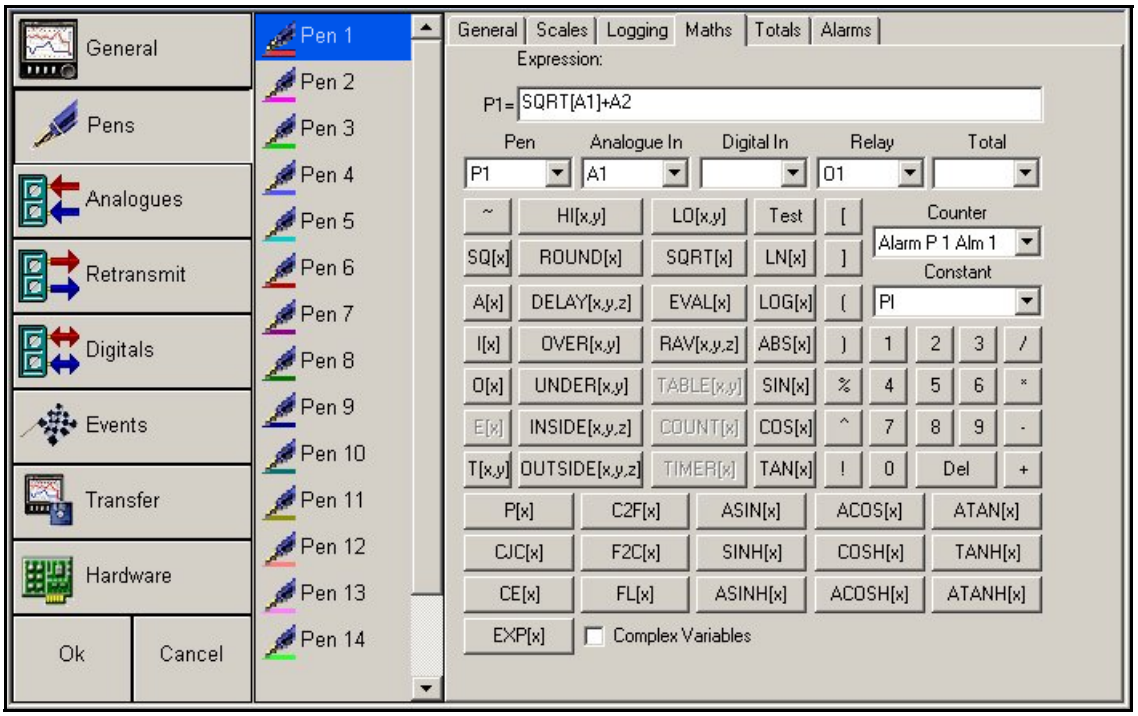
Up to 16 extra pens are available for the ***100mm thumb*** recorders. Up to 32 extra pens for the ***180mm*** recorder. Up to 6 extra pens for the ***100mm key*** recorder.

Up to 64 integral "soft" alarm set points are available for the ***100mm thumb*** recorder. These can be set by the user to announce selected out of limit conditions. *See "Appendix A - Maths Expressions for 100mm &180mm recorders" on page 255.*

Only limited maths functions are available on the ***100mm key recorder*** with directional key.

..

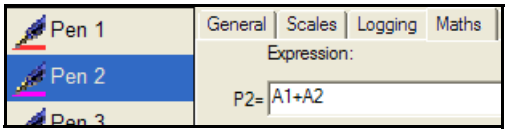
FIGURE 6.10



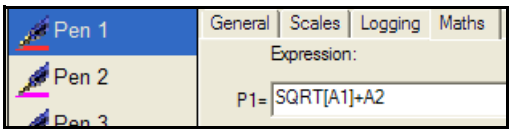
example shown is for a ***100mm recorder*** (with thumbwheel) configuration

Maths (examples)

Here are some maths expression examples:

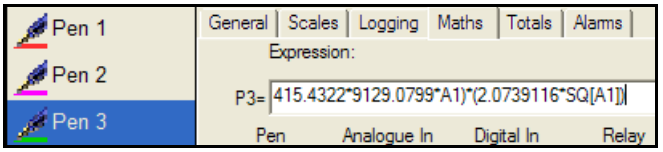


The first example is simple, with Pen 2 selected it will show the sum of analogue input 1(A1) plus analogue input 2 (A2).



The second example shows Pen 1 selected, this will show the square root of analogue input A1 then added to analogue input A2.

Here Pen 3 is selected showing a Quadratic Fit for a Type B Thermocouple.



For use of maths with the fail safe option, see *"Boolean Expressions" on page 262.*

Totals

A ***Totaliser*** is normally associated with flow monitoring applications, where the input to the recorder would be a measure of flow rate (e.g. in litres per minute). The ***Totaliser*** can then measure the total amount that has flowed over a certain period of time. ***Totalisers*** are assigned to individual pens.

Tick to Enable, enter the ***Pen Units***, which are the same at the units label on the pen scales page representing the label applied to any scale. Enter the ***Total Units***, which are the units the totaliser is collecting in. Eg. if the input is mA, a likely totaliser units would be kAh.

The ***Factor*** will convert the units you measure in to the units you want to totalise in. Use the ***Totalise Helper*** to assist in setting up these measurements, and working out the totalising factor.

NOTE: Totalisers do not work on a logarithmic scale, a warning message will be activated to notify the user.

Additional Controls

- **Ignore back flow:** When enabled any negative values are ignored and the total value will be held and never decrease.
- **Restrict range:** Activates min/max ranges.
- **Standard form:** Displays totalised values in standard form e.g. 2.76823e+09 regardless of length of the number.
- **Carry on rollover:** Only active when the Restrict Range option is ticked and min/max ranges are set. This function allows any amount that goes over the maximum scale range (Max) to be added to the minimum scale range set (Start). When this is not active, the reading will return to the minimum scale range set.

Alarms

The unit must have an alarm card, or a digital Input/Output card fitted.

The ***Pen Alarms Setup*** window is where the alarm levels for each pen are configured. Alarms can be set to trigger events such as log events, set relays, change log rate or flush data etc. *See "Setting up Events" on page 136.*

Alarm Controls

The first box marked ***Alarm*** has a drop down box containing currently available alarms for that pen. If no alarms have been configured the box will show ***None***. To add an alarm select ***New***, this will automatically be assigned a name. The ***Delete*** alarm button removes the currently selected alarm from the list.

If there are no alarms showing, check the alarms have been configured in the Hardware wizard. *See "Add New Recorder" on page 122*

When an alarm is allocated to a pen it is given the next available number.

e.g. If Pen 1 has 2 alarms 1 and 2, then if an alarm is set up for Pen 2 the next available alarm number would be 3. If the user then went back to add another alarm to Pen 1 this would be alarm 4 and so on.

Alarms allocated to a pen can be graphed using Maths. *See "Maths" on page 129 and.See "Appendix A - Maths Expressions for 100mm &180mm recorders" on page 255.*

NOTE: Alarms are based on linear input values apart from when the pen scale is logarithmic then the alarm threshold is based on the exponent of the log scale. When an alarm is created, on a logarithmic scale, a warning message will be activated to notify the user.

Enabling Controls

Enable as ***Always*** makes the alarm always active, continually checking and ready to be triggered.

The ***By Digitals*** option is only available if the recorder has an alarm card fitted which has the digital input/output function. It is necessary to setup the digital I/O card before this option shows as available. To configure the digital I/O, click on the Hardware Button to add a alarm card with digital I/O capability (if fitted in the unit as an option). *See "Digital input/output port setup" on page 135.*

By Digitals enables the alarm if one of the digitals has entered its specified state determined by the Digital Inputs button. This button activates a list where by the available digital inputs can be added or removed to the list of triggered alarms.

The ***Disable*** digital is its default state and if selected, the alarm will appear in the recorders alarm list but will not be active.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

General alarm settings

Select the ***Type*** of alarm, either ***High*** or ***Low*** so if the level goes above the stated value, on a high alarm, or below the stated value, on a low alarm, the alarm will be triggered. ***Log mode*** should be set to ***Normal*** unless the log rate needs to change when the alarm is active, then select ***Alarm*** Set the alarm ***Level*** by entering the numeric value at which the alarm is to be activated, the level is in terms of pen units so must not exceed the current pen scale. ***Log as Event*** will log the alarm state entry and exit to the event window. For ***Mark on chart*** the Log as Event item must be checked as well to use this. Places a mark on the chart on alarm state entry and exit.

Choose whether to ***Trigger relays on alarm entry,*** tick this to produce the Relay Outputs button. Select relays from the ***Relay Output*** list and add to *Trigger Output* list using the ***Add*** and ***Remove*** buttons.

Advanced options

Hysteresis gives the alarm a tolerance level. It allows a specified percentage value of the full scale to be added on to the alarm level.

The ***Symmetrical*** option is only available for ***100 or 180 mm*** recorders. This divides the hysteresis value equally on either side of the alarm. If the Hysteresis value was 10%, and the symmetrical option is enabled, then the logged reading would trigger at 5% (of the full scale value) below the alarm level. For the alarm condition to end, the alarm would have to rise to over 5% (of the full scale value) above the alarm level.

Damping

With this enabled, an alarm level must be breached for a specific period of time before an alarm is triggered. Enable this function and enter a time limit here, in hours, minutes and seconds with a maximum time of 12 hours.

Analogue General tab

Choose the ***Analogue*** button and then select an Analogue input number from the list, eg. Ana 1. In this tab click in the Enable box to activate and assign a label to identify the input. Also under the ***Analogue General*** tab is a ***Damping*** setup which, by default, is set to disabled. This will average the incoming signal over a specific period of time from 1 to 15 seconds thus creating a damping effect.

Enter the ***Time factor*** or width of the pulse, to be rejected, this can be set from 1 to 15 seconds.

Set the ***Transient Filter*** to ignore a specified type of pulse. This is used to filter out any electrical interference from external influences.

The ***Threshold level (%)*** or depth of the pulse is entered as a percentage of the span. The span is defined by the Engineering span e.g. Eng Zero = -10, Eng Span = +10. Enter pulse depth as a percentage of span = 20. If the signal is within 20% of span the point will be logged, if the signal is outside the 20% of span the signal will be logged as the previous point.

Square Root Extraction, tick this box if you require a non linear signal to be converted into a linear scale.

Analogue Scales tab

Use this section to enter set up information for the Analogue scales. Select the ***Analogue Input Type*** of signal coming into this port, Current, Volts or Thermocouple, Resistance Thermometer (if fitted). Current and Voltage inputs are linked to the first scale in the Scale Mapping Diagram.

When the ***Tie To*** is set to a Pen eg. ***P1*** from the drop down list, then the Eng scale is tied to P1 pen scale. This is to force the engineering scale to be linked to and be the same as the pen scale. This means the engineering scale is not changeable because it is locked to the pen scale.

Set this option to ***None*** and the Eng scale is no longer tied to the pen scale.

If there are no pens available that means that no pens are associated to that particular Analogue Input. Go to the Pens tabs and select Maths eg. against P1= enter A1. Now when you go return to this tab Pen 1 will appear in the Tie To drop down list.

Dependencies lists all pens which refer to this input.

Scale Mapping Diagram displays graphical examples of the Input scale, the Engineering scale and the Pen scale.

The first is the ***Input Scale*** for Current (mA), Voltage inputs (V & mV). Select the input range and enter the top and bottom values of that input range. *Figure 6.11* shows a Voltage range of +/-10V, but this scale has been manual changed to 0 to 10V. The full scale still shows the -10 to +10 range with zero in the middle.

The ***Eng Scale*** becomes active when the Tie To option has not been selected. Enter the top and bottom limits of the Eng scale to the part of the Input you want to display.

Engineering scale label – enter text here for the engineering label.

Engineering span – this is the highest value of the engineering range and corresponds to the top of the input range.

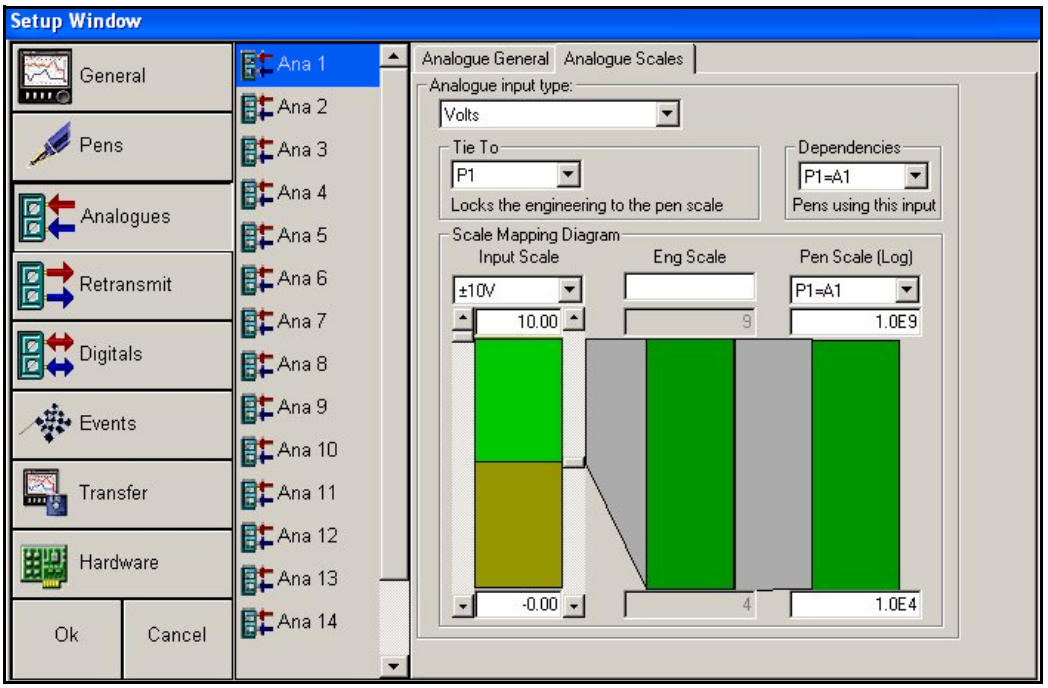
Engineering zero – this is the bottom of the engineering scale and represents the bottom of the input scale.

In *Figure 6.12* the Pen scale is displaying only the part of the input range as specified by the values entered in the Eng scale.

.

FIGURE 6.11

Shows P1 is selected and the Eng scale is locked to the pen scale



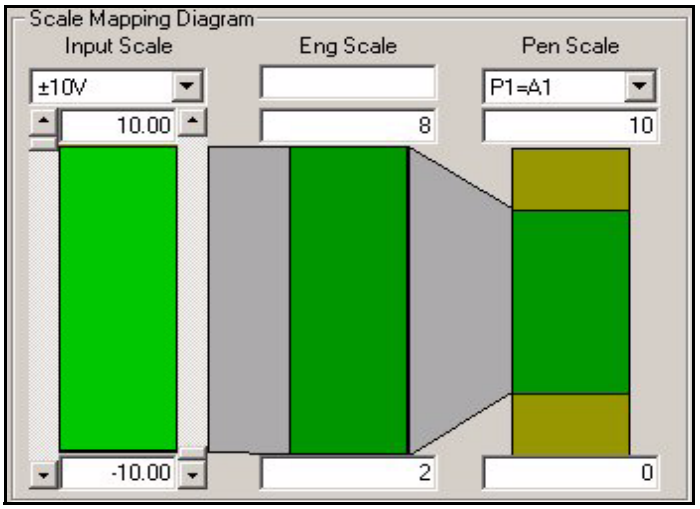
The ***Pen Scale*** lists pens which are available for a particular Analogue input. The Pen Scale is linked to the scale information set up in the Pens tab. The Pen Scale can be changed manually by entering top and bottom pen ranges.

Pen Scale is only available if a pen or pens use this analogue directly Eg. if P1=A10 and P10=A10 are set up for P1 and P10's math expressions respectively, they will appear here and the user will be able to set up the pen scales from here as well as in the pen scales page.

The Pen scale title will change to "Pen Scale (Log)" when a Log scale has been specified. The logarithmic values will be displayed in scientific notation, eg. 1.0E4 represents 10 to the power of 4.

Note: Logarithmic scales cannot be reversed so if the top value on the scale is less than the bottom value the limits will be switched.

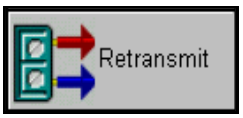
FIGURE 6.12



If the type of analogue input is a ***Thermocouple*** use the ***Range*** drop down menu to select the type of Thermocouple and the unit of measurement. Tick the box if up scale burn out is required. The ***Reference Junction*** measures the temperature at a designated point.

Internal Automatic - Uses the cold junction sensor in the recorder as a variable reference temperature. ***External 0 ×C*** - Assumes the cold junction is held at 0 °C to provide a 0 mV reference, external to the recorder. ***External Specify*** - Uses a Reference Junction held at a constant temperature. Specify the temperature that the cold junction sensor is to be set at. ***External Input*** - Use a thermocouple or resistance thermometer from another channel to measure as the cold junction sensor.

If the type on analogue input is a ***Resistance Thermometer***, select this from the analogue input type drop down menu. This screen only requires the range and the unit of measure to be entered. A Resistance Thermometer measures the resistance of the device and produces a temperature



Analogue Output Setup or Re-transmission

Not available on the ***100mm key recorder.***

If a ***Output*** card is fitted, the available analogue outputs will be displayed as a list. Click on an output and tick to enable, select a pen from the drop down menu. Tick to enable over range if required, this allows 4 mA either side of 4-20 mA. If this option is not available but the unit has a output card fitted, check the details have been entered correctly in the Hardware wizard.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Digital input/output port setup

NB: Each Input/Output line is shared so it can only be an input or an output. Select each digital from the list e.g. Dig1, this will appear in the ***Label*** box. The label is to identify the condition of the input, for example ***On State*** could be labelled ‘Pump On’ and ***Off State*** could be labelled ‘Pump Off’. Use the On/Off state to enable each digital.

Specify the ***Direction*** of the line, select either an ***Digital Input*** or a ***Relay Output***.

There is a ***Fail Safe*** option which can be activated on the relay output direction, this holds the relay in an energised state until triggered by an alarm, when the relay is de-energised. Any power failure will cause the same result. When using fail safe with a maths expression refer to *“Maths and Fail Safe” on page 262.*

Choose the ***Log to event window***, this will prompt a message to appear in the events list window when the digitals change state.

Check the ***Place a mark on the chart*** box to place a notification mark onto the chart when the digital changes state.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Events System

To use the Events system with the recorder the Events option must be active on the recorder. The Events option can be added to the recorder at any time.

Events are certain conditions or operations which can be setup and logged according to the time and date of the occurrence, subsequently they can be reviewed in a list or represented on a graph. Click on the ***Events*** button from the side bar and select an event number from a list of up to 32 separate events. Tick Enabled to activate the screen. Each event can be named, for identification purposes.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

For details on viewing recorder Events and Batch information, see *“Recorder Event/Batch Viewer” on page 164*

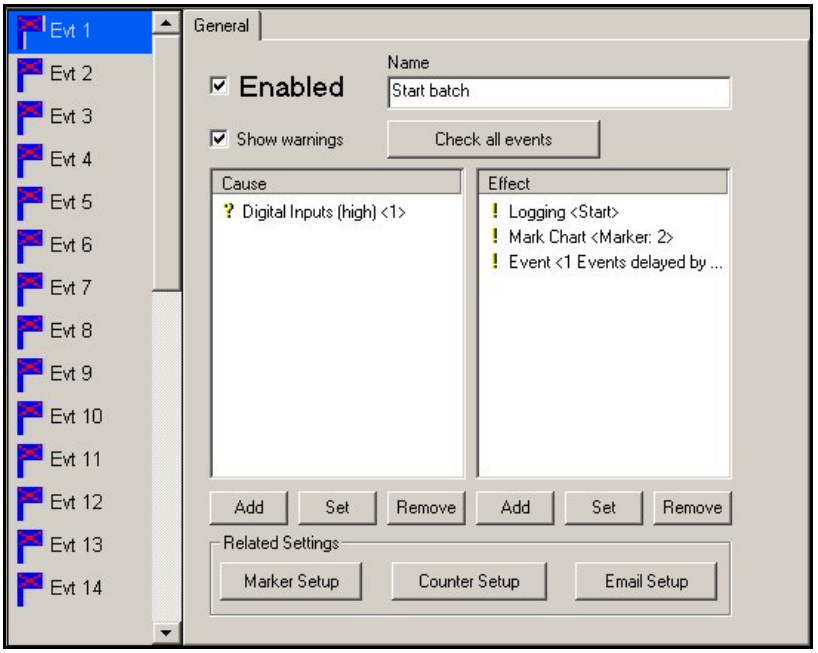
Setting up Events

Events can be set up so when a condition occurs during recording it produces an outcome, this is known as '***Cause***' and '***Effect***'. Select a ***Cause*** and the ***Effect*** by clicking on the **Add** box at the bottom of each Cause and Effect window for a selection list.

Limited Events are available on the ***100mm key recorder***. For listings of Events 'Cause and Effects', see *See "Appendix D - Events" on page 283.*

For displaying Events on a graph, see *"Graphing Events" on page 213.*

FIGURE 6.13



example shown is for a ***100mm recorder*** (with thumbwheel) configuration

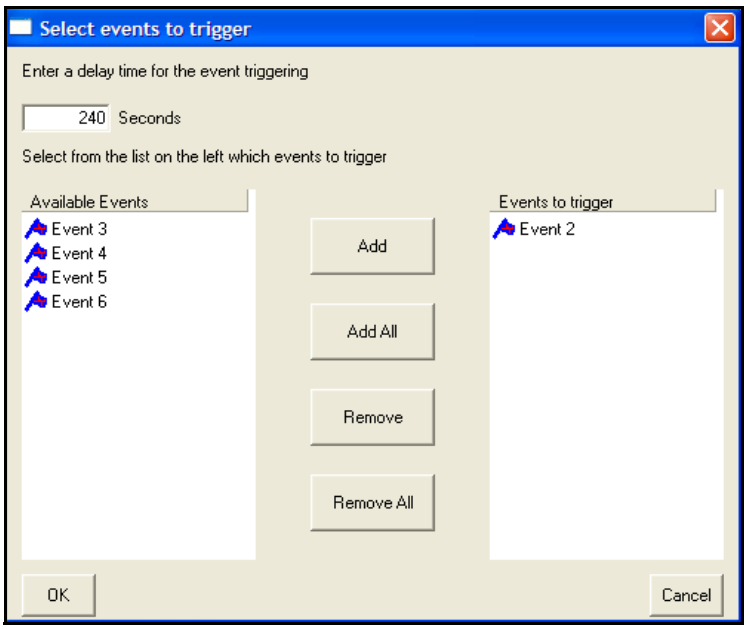
As shown in *Figure 6.13*, one single cause can be set up to have many effects. The event set up here shows that when the Digital Input goes high the effects will be:

- Logging will start (Logging <Start>).
- A Mark will be placed on the chart (Mark Chart <Marker1>).
- Event 1 will be activated (Event<1 Events delayed by 60 seconds).

If ***Into Alarm*** or ***Out Alarm*** are selected as a Cause, the alarm selection dialog box will appear displaying all the available alarms.

If an Event is selected to be an Effect, the ***'Select events to trigger'*** box will appear. In *Figure 6.14*, Event 2 has been selected with a delay time of 240 seconds.as an Effect of Event 1.

FIGURE 6.14



example shown is for a ***100mm recorder*** (with thumbwheel) configuration

Event 2 does not require a Cause to be set as it will be forced to activate from being an Effect of Event 1. See *Figure 6.13 on page 136*. Event 2 has been set up to Stop Logging after a time period of 240 seconds and Mark the chart.

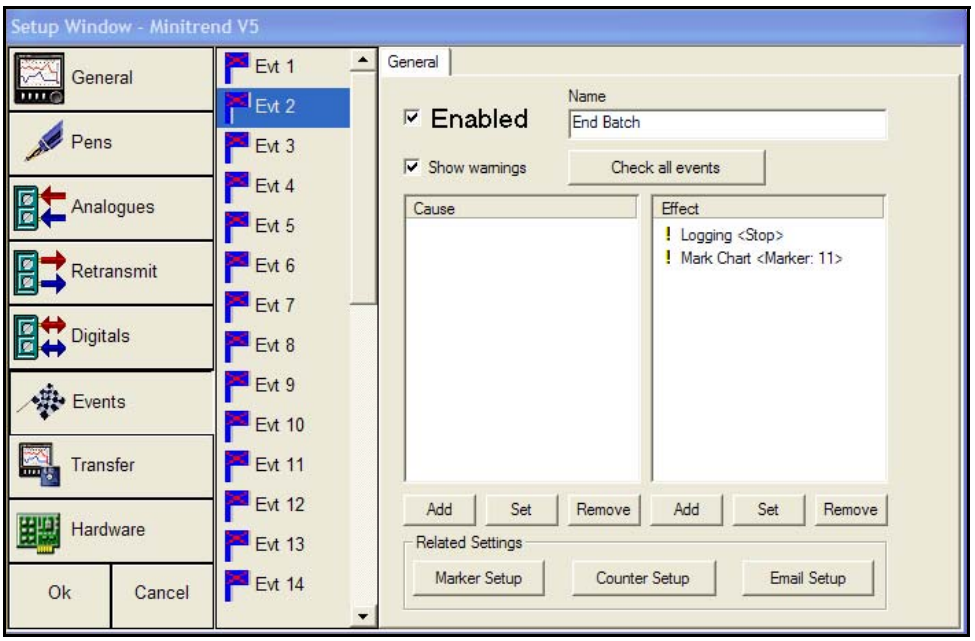
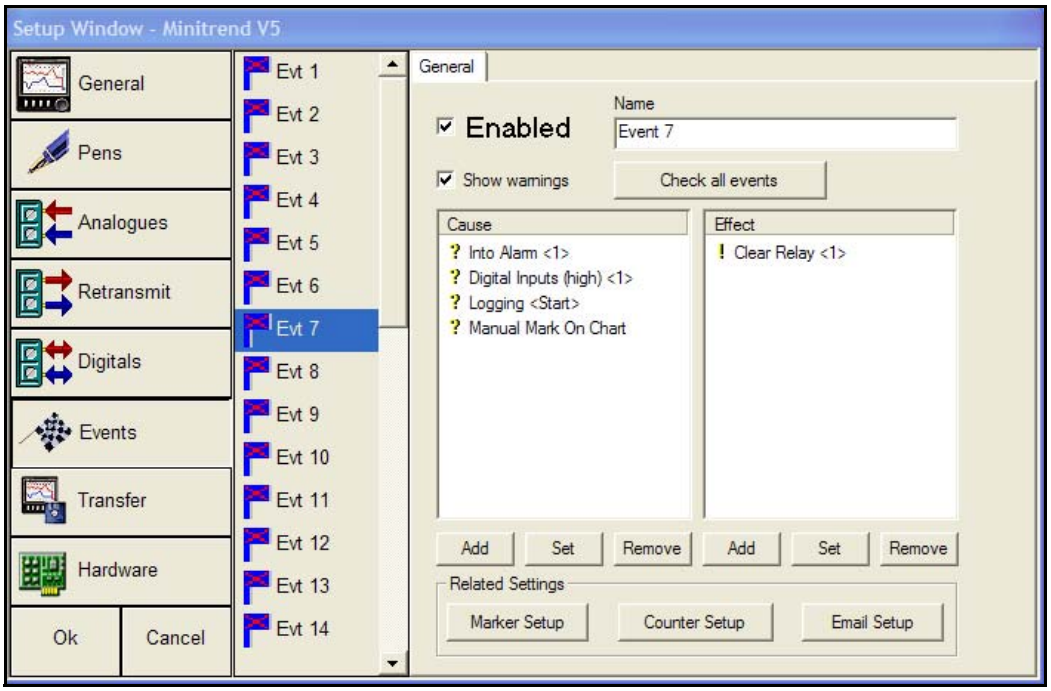


FIGURE 6.15 example shown is for a ***100mm recorder*** (with thumbwheel) configuration

NB. Use the ***'Check all events'*** box to verify the setup will work correctly. A warning message may appear to check the entries are correct.

Alternatively many ***'Causes'*** can be setup to have the same ***'Effect'***. Up to 32 separate Events can be setup with up to 20 ***Causes*** or ***Effects*** in each Event, shown in *Figure 6.16*.

FIGURE 6.16



example shown is for a ***100mm key recorder*** configuration

For listings of Events 'Cause and Effects', see *See "Appendix D - Events" on page 283.*

For displaying Events on a graph, see *"Graphing Events" on page 213.*

Event Marker Setup

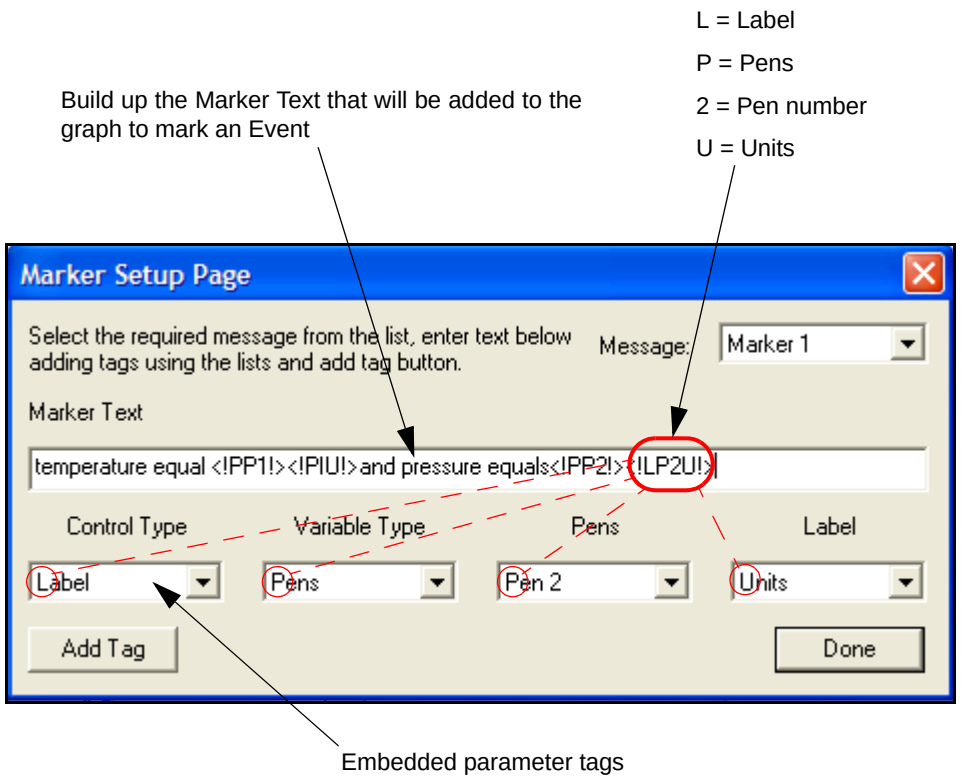
Event Markers are messages posted onto the recorders screen, when an Event occurs. There are 20 event markers that can be customised, each marker can have up to 80 characters with embedded parameter tags <!***!> allowing real-time recorder data to be inserted into the text.

The Event Marker is truncated to display only 40 characters on the graph, the full 80 characters will be displayed in the message screen.

Select the marker number from the ***Message*** box, 20 markers are available for use, markers 10 to 20 are set up with pre-defined control characters that can be edited and added to. For more information, *See "Batch Mode Event Markers" on page 141*.
Enter text into the ***Marker Text*** box and add the embedded parameters tag, if required, using the drop down lists marked Control Type, Variable Type, Pens and Label

.

FIGURE 6.17



The Marker Text can be built up using combinations of user entered text and the embedded parameter tags.

Figure 6.17 shows an example of Marker text, this is how it is broken down.

‘Temperature equals <!PP1!><!LPU!>and pressure equals <!PP2!><!LP2U!>’

‘Temperature equals <!PP1!>’ this tag is telling the system to process the information on Pen1 and add it to the marker.
‘<!LP1U!’ means add the Pen 1 as a label to the marker plus the units in which it is measuring e.g. seconds, inches or °C.
The second part reads ‘pressure equals <!PP2!>’ this is telling the system to process the information for Pen 2 and add it to the marker.
‘<!LP2U!>’ means add Pen 2 as a label plus the units of measurement to the marker.

This will insert the values of Pen 1 with the Units for Pen 1 and the value of Pen 2 and the Units Pen 2 into the marker.

A tag must be placed within the text to ensure the recorder information, e.g. the Pen value, is inserted. When the marker text is finished click on the ***Add Tag*** button and click ***Done*** when all markers are complete.

For help on setting up markers use the *“Marker tables (only available for 100 or 180 mm recorders)” on page 140.*

Marker tables (only available for 100 or 180 mm recorders)

Embedded parameter tags <!***!>

Control Type	Variable Type	Pens	Label
Process	Pens	Pen number?	-
	Digital Inputs	Digital number	-
	Relays	Relay number	-
	Totals	-	-
	Counters*	Sub type	-
		Event*	Event number*
		Alarm*	Alarm number*
		Digital*	Digital number*
		User*	-

Control Type	Variable Name	Comms port
System	Disk usage	-
	PC card usage	-
	Memory usage	-
	ASCII Input	Front RS232*
		Rear RS485*
		Rear RS232*

Control Type	Variable Type		Label
Label	Pens	Pen number	Tag
			Description
			Units
			Scale
	Digital Inputs	Digital number	Tag
			State text
	Relays	Relay number	Tag
			State text
	Totals	-	-
	Counters*	Sub type	Label
		Event*	Event number*
		Alarm*	Alarm number*
		Digital*	Digital number*
		User*	-

Counters and sub-types marked * are not available on the ***100mm key recorder***.

Batch Mode Event Markers

For Batch Mode the Event markers 10 to 20 have pre-defined control characters set up for controlling batch information. These can be edited and changed adding information for each marker. Markers 1 to 9 default as blank markers but can be used for Batch Control.

Marker Number	Control Character	Function	Description
10	//S	Start Batch	Places a marker to Start the batch. This **MUST** be followed by a space and then the Batch name or number.
11	//E	End Batch	Places a marker to End the batch.
12	//P	Pause*	Places a marker and Pauses the Batch *
13	//R	Resume	Places a marker and Resumes a Paused batch
14	//A	Abort	Places a marker and Aborts the batch
15	//+	Add text to Comment	Places a continuation marker to add a user defined text to a Comment
16	//B	Rename a Batch Name or Number	Used to identify when a Batch Name or Number needs to be renamed, as an individual marker or as a part of a Marker
17	//D	Batch Description	Places a Marker on its own plus a user defined Batch Description, or can be added as a part of a Marker
18	//I	User ID	Places a Marker on its own, plus a user defined ID, or can be added as a part of a Marker
19	//L	Lot number	Places a Marker on its own, plus a user defined Lot information, or can be added as a part of a Marker
20	//C	Comment	Places a Marker on its own, plus a user defined Comments, or can be added as a part of a Marker

*Pause can be de-activated by using //E (End Batch), //R (Resume) or //A (Abort)

It is recommended that the Batch name or number be added to //S, //E and //A to identify the batch.

Examples of Batch Event markers

1. //S 240 //I Roger //C Start Event Count <!PCE1!>
2. //P 240 //C Pause for reading <!PCE1!>
3. //A 240 //I Roger <!PCE1!>
4. //E 240 //I Roger //C End Event Count <!PCE1!>

Marker number 1: //S = Start Batch, 240 is the Batch name, //I = ID of User “Roger”, //C = Comment “Start Event Counter”, <!PCE1!> = Process/Counter/Event1.

To increment batch numbers use the ***Counters*** feature. *See “Event Counter Setup” on page 142*

Markers on the Recorder

When Event/Batch markers have been set up they can be up-loaded into the recorder using the FTP facility. *See "Importing Data via FTP or Secure Communication Interface" on page 156.*

Markers can also be entered into the recorder via the keypad on the front of the recorder. Turn the thumbwheel to produce an arrow, press to select. The chart menu will appear, select the ***Mark on chart*** option from the menu using the thumbwheel. Text can be entered using the thumbwheel, creating a new mark on chart or editing existing markers.

For details on viewing recorder Events and Batch information, see *"Recorder Event/Batch Viewer" on page 164.*

Barcodes for Batch

Batch markers can be created using independent barcode software. The barcodes can then be read using a barcode wand or reader. Any type of Batch marker can be encoded into a barcode using the same control characters used to build up a batch marker.

This example shows a barcode encoded to start a batch:

//S = Start Batch

216 = Batch name

//I = User ID is Fred

//C = Comment text is Test

A barcode with up to 25 characters (including spaces) can be read into the recorder using the RS232 interface and suitable RS232 ASCII barcode reader.

Event Counter Setup

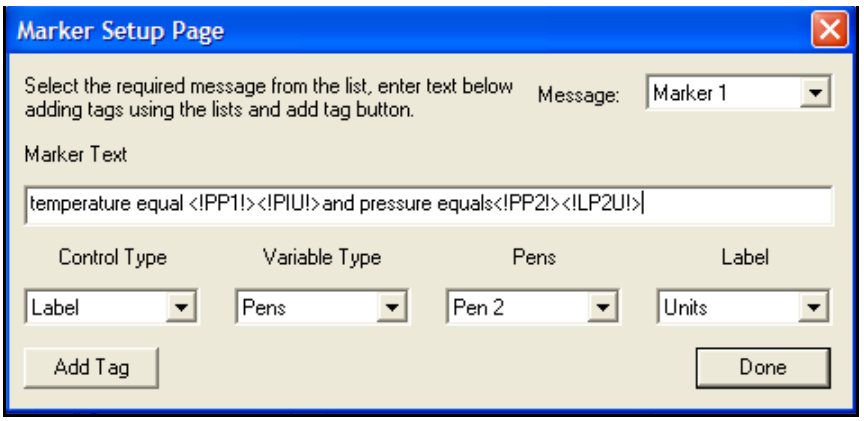
The Event Counter option is not available on the ***100mm key recorder***.

The ***Counter*** system can be used as a ***Cause*** or an ***Effect***. The Counter Cause triggers an Effect when a Counter reaches a specified value. The Counters can be reset using the Event Effect.

Counters as a Cause

Under the Cause window click on Add, select ***Counter***, as a 'Cause', to produce the ***Counter Cause Setup*** box. Enter the ***Type*** of counter from one of the four programmable counters; ***Event, Alarm, Digital*** or ***User***. All except 'User' are continually running in the background and are already enabled. The ***User*** type of counter can be used to count any type of event(s), see *"Counter Setup" on page 143.*

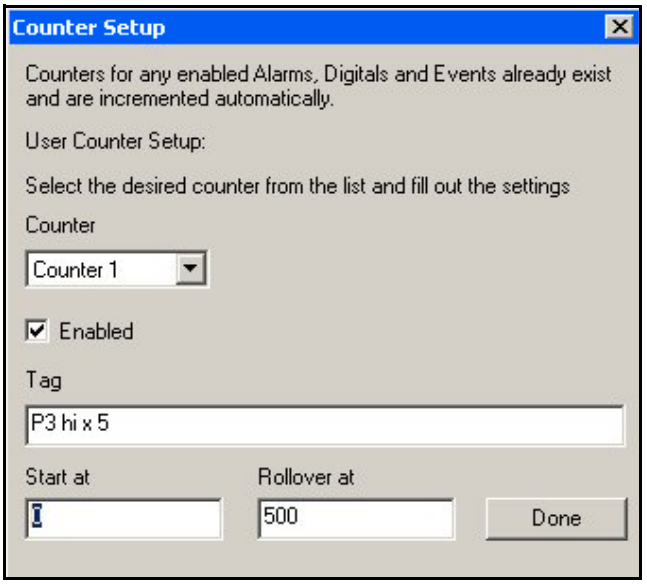
Enter the type of counter, which event is to be counted and the value of the count.



Counter Setup

Counter setup is only required when a ***User*** type counter is selected in the ***Counter Cause Setup*** box, see *"Event Counter Setup" on page 142.*

To activate, select the ***Counter Setup*** button at the bottom of the main events screen.



- Choose a counter number from 1 to 16 and click in the enabled box.
- Enter a tag or description to identify the counter.
- Indicate a Start point for the counter and a value in the Rollover box for the counter to reach and restart the count.

Click Done when complete. The Counter is in place and can be used on any Event.

Example: *Figure 6.18.*

FIGURE6.18

Configure Pen 2 to have a high alarm at 95%, set up Event 1 with a Counter as the cause. The counter value is set to 5 so when Pen 5 goes into alarm for the fifth time, an Effect is triggered. A tag can be added to appear on the recorder screen when the counter has reached its value and the event has been triggered.

Counter as an Effect

Resets or increments User, Alarm, Digital or Event Counters.

Select the type of Counter effect User, Alarm, Digital or Event. Select a counter from the drop down menu.

Only the User counter will enable the option to ***Reset to*** or ***Increment By*** and a value to be entered.

Using/Viewing Counter Values

The value of a Count can be used in Maths, Markers or E-mail messages. Display or log through the maths expression.

For details on using counters as part of a Maths expression see *See "Appendix A - Maths Expressions for 100mm &180mm recorders" on page 255.*

- CUn = Counter User (where n is the User counter number)
- CAn = Counter Alarms (where n is the Alarm number)
- CEn = Counter Events (where n is the Event number)
- CDn = Counter Digitals (where n is the Digital input number)

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Event Email setup

The ***E-mail Event*** is an effect triggered when a particular cause is executed. Setup pre-set E-mail addresses and messages for use with the Events System. The ***E-mail Setup*** button is at the bottom of the main events screen. Up to 8 destination E-mail addresses can be entered, including 1 Administrator addresses for when mail is unsuccessfully delivered. The administrator address also acts as a source of the E-mail.

- Enter the recipient's name and E-mail address (not forgetting an E-mail address for the Administrator).
- Select a message number and subject.
- Type the message information to be E-mailed in the Message text box.

Click on Done when complete. The message is now in place and can be used on any event where the E-mail option is selected as an effect.

General operation of the E-mail system.

The recorder sends messages for distribution by an ***E-mail Server***. The E-mail server is located by its ***IP Address*** as set-up in the communications set-up options. When the recorder sends an E-mail message, it locates the E-mail server and uses SMTP (Simple Message Transfer Protocol) to send the message to the E-mail server. SMTP allows the recorder to send messages to an E-mail server without having its own E-mail address; because of this the E-mail server will not be able to send any reply back to the recorder.

When setting-up the E-mail address list, it is important to include the E-mail administrator address. The ***Administrator E-mail Address*** is the E-mail address to where the E-mail server will respond in the event of any problems with the delivery of E-mail messages. The Administrator will also appear to be the source of any E-mail messages sent by the recorder. Most E-mail systems require a 'Reply To' address as part of an E-mail message, since the recorder does not have its own E-mail address; it uses the E-mail administrator as the 'Reply To' address.

Any E-mail message will consist of a delivery list (recipients), a subject, and an optional message body. The message body may be omitted for very short messages, or where the message is to be sent to a paging system.

Setup Auto E-mailing

The ***E-mail Subject*** may be either one of the existing ***Event Markers***, or one of the two E-mail subjects. E-mail subjects can be preset into the E-mail system e.g. a Report required to log the same information as a regular event.

E-mails can be made up from:-

1. One of the two standard messages preset into the E-mail system.
2. Markers preset up in the Marker set-up system.
3. Text

Or combinations of 1, 2 and 3.

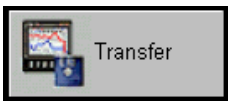
The ***E-mail message body*** may be either one of the existing event markers, or one of the two E-mail message blocks. ***Event Markers*** are restricted to 80 characters each. The two E-mail message blocks are restricted to just over 1000 characters each. Both the message subject and body may contain embedded marker tags as used in the event markers.

When the recorder sends an E-mail message that includes a message body, the recorder name, recorder number and the time/date will be appended to the end of the message body text. This is to allow easy identification of when the message was sent, and by which recorder.

Any E-mail message is sent as an effect within the recorder events system, so anything that can be configured to act as an event cause may be configured to send an E-mail message. Any E-mail message may be sent to up to 8 of the recipients. If the E-mail server supports named groups of E-mail addresses, an E-mail message may be sent to a combination of E-mail addresses and E-mail groups.

From the Events Set-up screen

- Set-up the required event marker messages. Note that the same message may be used both as an event marker (mark on chart) and as part of an E-mail message (subject or body).
- Select the E-mail Set-up button at the bottom of the Events Set-up screen.
- Enter the list of E-mail recipients, not forgetting the E-mail Administrator address.
- If either of the two E-mail subject fields, or larger E-mail message blocks are required, they will need to be set-up.
- Select the Done button to close the E-mail set-up screen.
- Select the required event to which E-mail message is to be attached, and select. The Add button below the Action list, and from the list of available actions, select E-mail. The Set-up auto E-mailing screen will then be shown.
- Select the required E-mail subject and message body text from the drop-down list boxes.
- Select the required E-mail recipient(s) by highlighting the E-mail address and selecting the Add button. Note that up-to 12 recipients may be used for each E-mail message, see *"Email tab" on page 90.*



Importing and Exporting of Set-ups

The ***Transfer*** button is where the ***Setup*** can be imported from other recorders or exported to other recorders via removable media. Click on the transfer button to either ***Import*** or ***Export,*** identify the setup to import or the location to export to using the ***Change*** button.
If you are importing data from a disk and there are multiple sub directories (one for each recorder), point at a specific sub-directory to import just that recorder or the root to import all the recorders. Choose a folder to import from or export to e.g. 'A' drive for a floppy disk.

For more information on importing data and setups, see *"Importing" on page 155*

For importing via FTP, see *"Importing via FTP or Secure Communications Interface" on page 156.*

Hardware Related Set-ups

This will only be used there are changes to the hardware fitted to the recorder. For example; when adding options cards such as an Relay Alarm card, Digital Input/Output card or Pulse card (***QX and SX***), Comms card option (***100mm tumb and 180mm***).

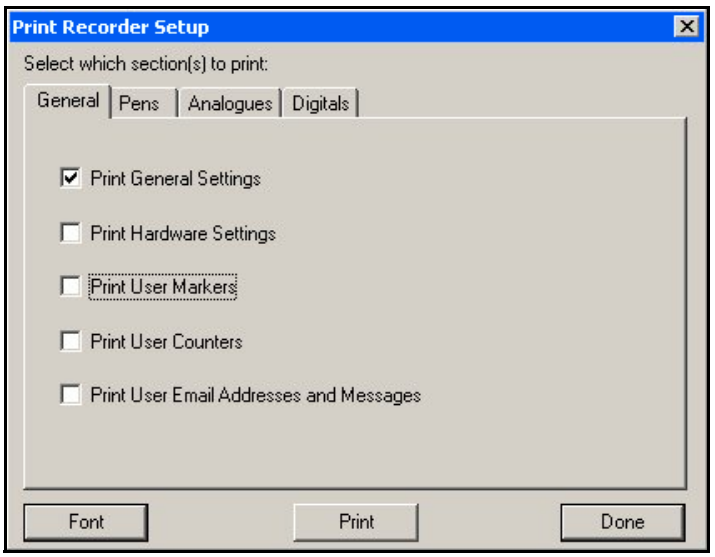
Recorder configuration complete

When all setups are complete press OK, a prompt to save will only appear if changes have been made in the setup window.

Printing Setups

100mm &180mm Recorders

Select the recorder button on the left and right click on the recorder containing the setup required to be printed. Select the Print button and choose the setup required form the list and press OK.



NB. Full recorder configuration can take up many pages. If this is required, select ***Landscape*** mode to cut down the page count. The ***Font*** type can be changed if desired. Click ***Done*** when each tab is finished and ***Print*** when all tabs are completed.

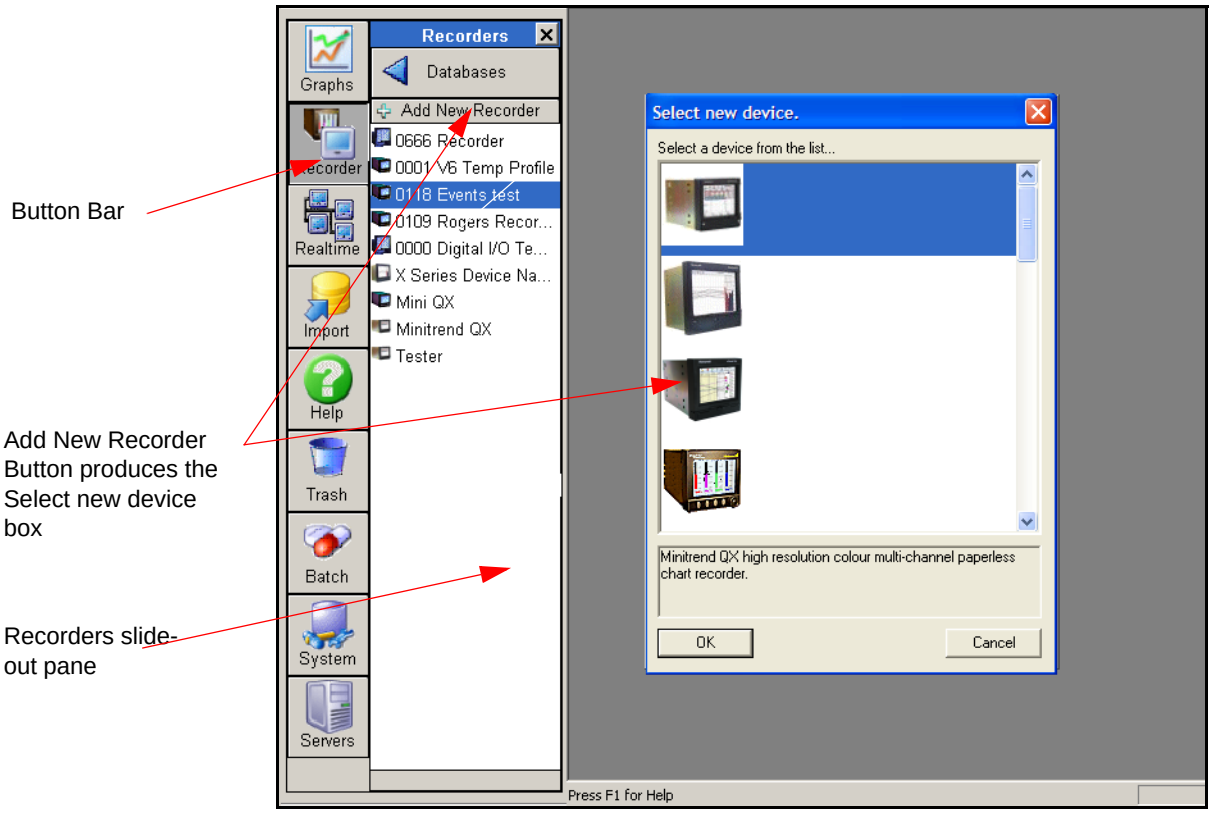
Select each tab for ***General***, ***Pens***, ***Analogues*** and ***Digitals*** to configure what is required in the setup printout.

Chapter 7: Trend Analysis Software

Recorders

All the areas listed below are covered in detail in the ***Trend Analysis Software Help.*** Click in any area on the screen and press F1 on the keyboard to display the related help files..

FIGURE 7.1 Add New Recorder



Add a recorder

See "Add New Device" on page 53 and "Add New Recorder" on page 122, for instructions on how to set up a new recorder.

Delete a recorder

- Go to ***Recorders list*** in the ***Recorders slide-out pane.***
- Drag and drop the desired recorder icon over a ***Trash can*** or right click and select Delete.

Note: this deletes all the data associated with this recorder

Copy a recorder

This copies only a recorder setup, not the data associated with this recorder

- Go to the ***Recorders list*** in the ***Recorders slide-out pane.***
- Right click on the icon and select copy.
- Select the desired setup from the setups list and click OK.

Edit a recorder

- Go to the ***Recorder list*** in the ***Recorders slide-out pane.***
- Double click or right click on desired recorder icon.
- Click on open. Select the desired setup from the ***Setups list*** and click OK.
- Make any changes, click OK. Follow any further instructions.
- Click Ok and confirm changes.

Import data from a recorder

For importing and exporting setups, see *"Importing" on page 155.*

For FTP transfer, see *"Importing via FTP or Secure Communications Interface" on page 156.*

Browse a recorder

Available with ***Trend Server*** only and if Ethernet is set up in the hardware Wizard, see *"Edit a recorder" on page 150.*

This function allows the user to browse a recorder on the web provided the recorder has been saved to a database with a configured IP Address. The recorder will have had an Ethernet card fitted to configure the IP Address. To browse multiple recorders, IE8 or higher version is required.

Open the recorder by double or right clicking, to reveal the browse button. Activate this button to generate a web browser window. The recorder will automatically be dialled up for viewing on a web page. *See "Web Browser" on page 180.*

Upload button

Available on ***Trend Server*** only and if Ethernet is set up in the Hardware Wizard, see *"Edit a recorder" on page 150.*

Setups can be loaded from a PC to a recorder via Ethernet. An Ethernet card must be fitted, as an option, to the recorder. The recorder must be saved to a database with a configured ***IP Address***.

In the recorder slide-out pane, double left click or right click on a recorder to open it. The Upload button will appear if a recorder has been saved to a data base and has an IP Address. This button will upload a setup from the PC to a recorder. Activate this button to produce the select setup box, the set up will now proceed via Ethernet connection.

NOTE: The above features are not available for the recorders which are part of Archived Database.

Recorder clash list

A dialog box is produced on import only if multiple devices already exist with matching device ID number or serial numbers.

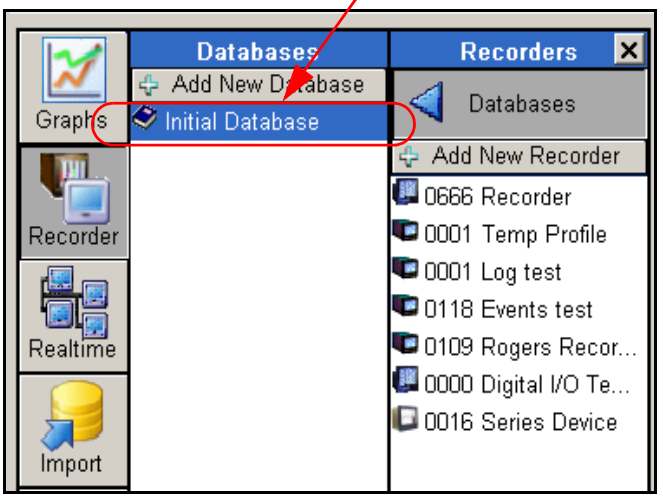
Databases

Add a Database

Go to ***Database list*** in the ***Recorders slide-out pane.***

- Click on ***Add New Database*** in the recorders list and the Dialog box will appear.
- Enter name and description then click OK. The same name may not be used on the same database server..

FIGURE 7.2 Add New Database



Change the current Database

- Go to the ***Database list*** in the ***Recorders slide-out pane.***
- Click on the desired database.

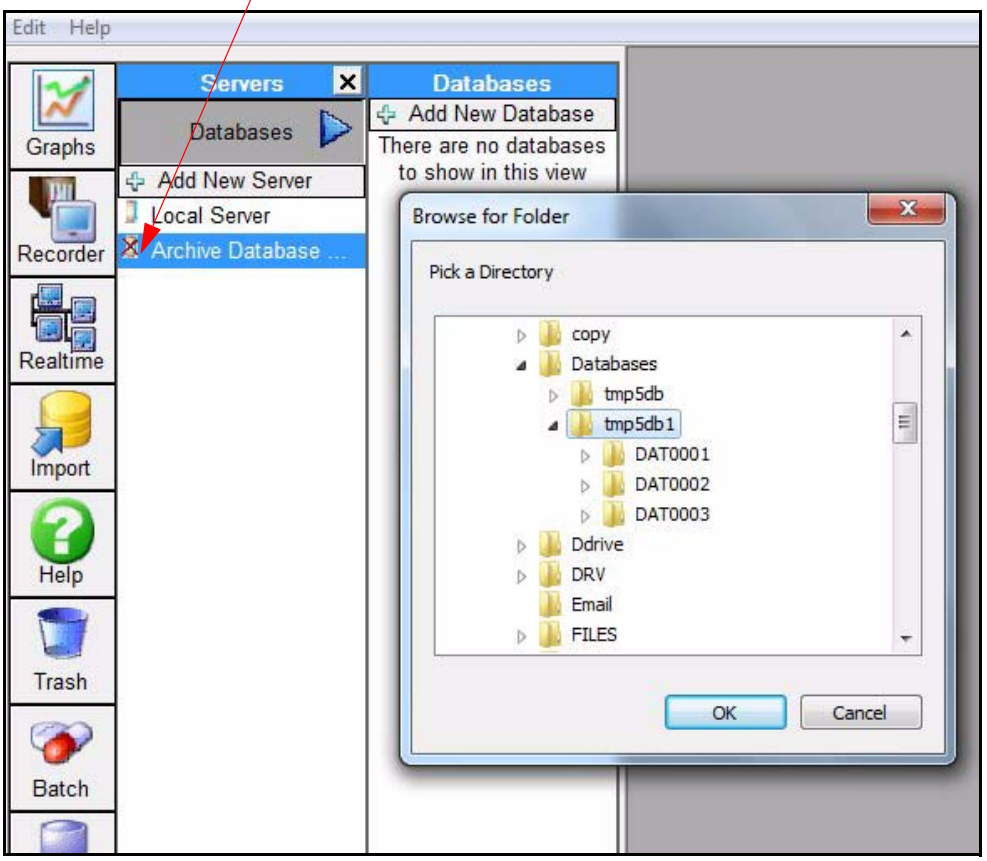
This will be the current database until another is selected.

Add an Archive Database

- Click on Server button and select Archive Database Server from the list.
- Go to the database list in the Recorders slide-out pane.
- Click on the Add New Database, a "Browse for Folder" Dialog appears.
- Provide the database path where Archive Database (backed up database) is located. Make sure after backing up the database the folder name should be modified to a name different from "tmp5db" or "TMP5DB". And then click ok , the database will get added to the databases.

Note: to backup the database you need to use Database Management Tool. Refer to *"Database Management Tool" on page 4* for further details.

A "X" mark in the Databases pane indicates that there are no databases assed to the Archive Database Server



Modifying Recorder setup

Database choice dialog box appears when importing from a recorder or saving an edited setup. If an existing recorder has been found in the database which has the same ID number and a different serial number or the same serial number and a different ID number, the user will be asked whether to save into this recorder's database area or to make a new device. If there are many similar recorders, the user is asked to create a new one or select a destination from a list.

All the areas listed below are covered in the ***Trend Analysis Software* Help.** Click in any area on the screen and press F1 on the keyboard to display the related help files.

Server access table.

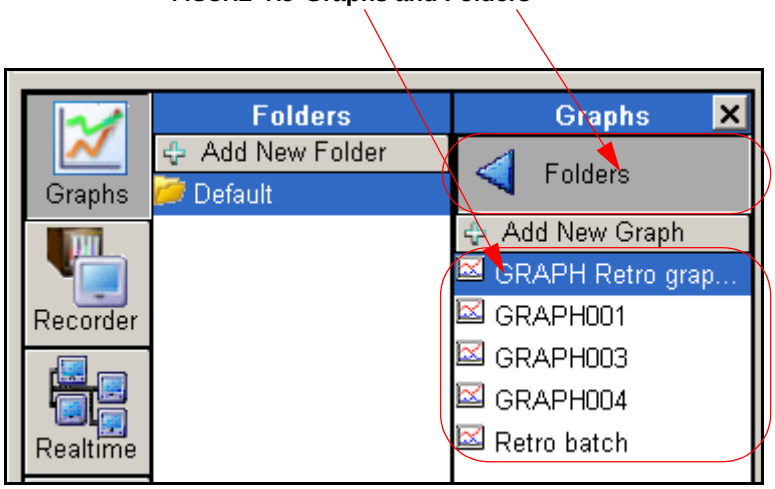
Server access	Server access	Servers		Databases	Recorders	Pens
Trend Server	Trend Manager	Local Server		Initial Database	rec 1	pen 1 pen 2 pen 3 pen 4
					rec 2	pen 1 pen 2
				New Database 1	rec 1	pen 5 pen6
					rec 2	pen 1 pen 2 pen 3 pen 4
					rec 3	pen 6 pen 7
				New Database 2	rec 1	pen 1 pen 2
		Archive Database Server	Remote Server 1	Initial Database	rec 1	pen 1 pen 2 pen 3 pen 4
					rec 2	pen 1 pen 2
				New Database 1	rec 1	pen 5 pen 6
			Remote Server 2	Initial Database	rec 1	pen 1 pen 2 pen 3 pen 4
					rec 2	pen 1 pen 2
				New Database 1	rec 1	pen 5 pen 6

Folders

Graph Folders

This is a list of folders in which the user can organise graphs.

FIGURE 7.3 Graphs and Folders



Add a folder

- Go to the ***Folders list*** under the ***Graphs slide-out pane.***
- Click ***Add new folder***, enter a name and click OK.

Move a graph between folders

- Go to the ***Folders list*** in the ***Graphs slide-out pane***
- Select a graph and drag it into the destination folder.

Delete a folder

- Go to the ***Folders list*** under the ***Graphs slide-out pane.***
- Drag and drop over a trash can to delete.

Copy a folder

- Go to the ***Folders list*** under the ***Graphs slide-out pane.***
- Drag the folder onto a blank area of the folders pane or double click and select copy.

Rename a folder

- Go to the ***Folders list*** in the ***Graphs slide-out pane.***
- Double click on the folder to bring up the control panel and click on the rename button.

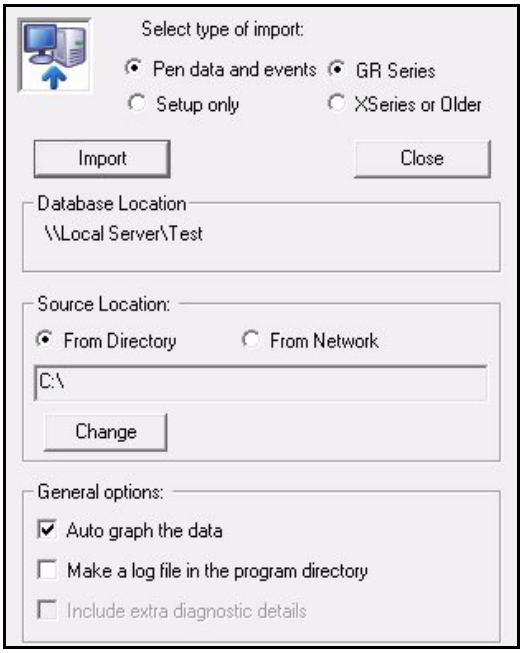
All the areas listed below are covered in the ***Trend Analysis Software* Help.** Click in any area on the screen and press F1 on the keyboard to display the related help files.

Importing

The Import button from the main tool bar on the left of the screen, will produce the ***External Import*** box. This function can be used to import ***data*** or ***a setup*** from an external storage device. See also *"Importing from TrendViewer" on page 155*

In the External Import box, select to import either data or setup. Ensure the correct information is available from the external storage device (Disk, Card, Compact Flash, SD card or USB key), and can be accessed.

FIGURE 7.4 External Import box



Database Location will identify which database to import to.

There are two radio buttons in this dialog, one for "GR Series" and another is for "XSeries or Older".

This options are application on for HardDrive import. In order to import GRSeries data we need to check **GR Series** button. To import**X Series** data or Older we need to check " **X Series** or Older.

The ***Source Location*** will default to ***'From Directory***. To change the file location, select the ***Change*** button. This will allow the user to browse the network to locate the desired file.

Alternatively a setup or data can be imported by selecting ***From Network (FTP).*** *See "Importing via FTP or Secure Communications Interface" on page 156.*

General options

Auto graph the data is active by default, this will automatically display the data that has been imported on to a graph.

Make a log file in the program directory. The make log file in the program directory option is useful if a disk won't import properly due to corruption. If used, a file named log.txt will be written to the program directory detailing exactly what was imported and when. Any errors encountered will also be listed here. The log file can be viewed using Notepad. The final check adds further details to the log file.

Imported data from the same recorder over different periods of time will be detected and loaded into the same database, the graph will display as a continuous trend.

Importing from TrendViewer

This will produce the graph data dialog which will import only data from an external storage device.

Importing via FTP or Secure Communications Interface

Available on ***Trend Server*** ONLY.

Trend Server uses FTP/IP (File Transfer Protocol / Internet Protocol), this is the transfer of data between a computer and a recorder or between two or more computers. Every Windows PC has FTP capability built in.

Trend Server has a Secure Comms feature which provides for the secure transfer of data between a computer and a **GR Series** recorder provided SecureWSD is be enabled and the credit option in the recorder is enabled. It uses authentication certificates that have been installed on the recorders and TrendServer for this secure communications. The **GR Series** recorders support a Credit enabled function for doing secure FTP data transfers since the normal FTP protocol is an unsecure protocol.

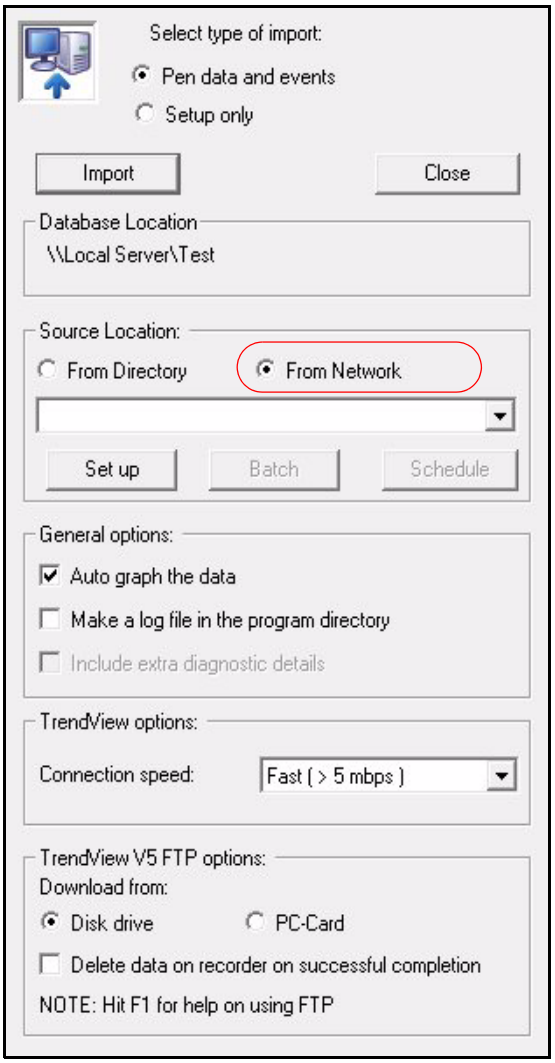
Trend Server offers the ability to import data from recorders via an Ethernet connection. This is standard on all recorders with an Ethernet card.

Due to the potential of large amounts of data that may be available it is not recommended to use FTP and Realtime at the same time.

For import via FTP select ***FromNetwork (FTP)*** as a ***Source Location***. This will reveal more of the box giving download information, see *"From Network Setup" on page 158*.

Importing Data via FTP or Secure Communication Interface

Select type of import, either Data or Setup, this is the same as for Importing from a directory except that when importing data via FTP you will have a choice of New data or all data. The All function will import all the data in the recorder's memory to the external device port. The New function will just import any new data since the last import was made.



Each recorder is identified by its name and a unique internet number known as an IP address (Internet Protocol Address). For more details on IP Addresses see your IT system administrator.

If the recorders and ***Trend Server*** are on the same local network, a number can be selected from a range of pre-allocated numbers.

Three buttons will become available.

- **Set up** - Add, Edit or Remove the recorder you wish to import from. *See "From Network Setup" on page 158.*
- **Batch** - *See "Batch set up" on page 159*.
- **Schedule** - The Schedule button is for adding this recorder to a time/date schedule to import data, see *"Schedule Setup" on page 159*.

Activate any further ***General options*** as required, such as - Auto graph the data, Make a log file in the program directory and Include extra diagnostic details.

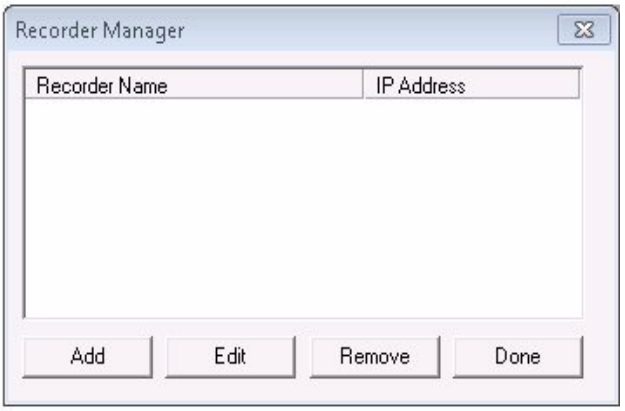
For **X & GR Series** recorders select your network connection speed. Please check with your IT support team as putting in a faster connection speed than the network can handle may cause the FTP transfer to work incorrectly and cause "Time Out" messages.

For ***100mm and 180mm*** recorders, select ***Disk drive*** or ***PC card**** to download from. If required tick to “Delete data on recorder on successful completion”.

From Network Setup

Click on ***Setup*** in the ***External Import*** box to produce the ***Recorder Manager***, this will be empty at first. Click on ***Add*** to add a new recorder, the ***Recorder Setup*** box will appear. To modify any existing recorders either select ***Edit*** or double click on the entry displayed in the box, this will also produce the ***Recorder Setup*** box. ***Remove*** will delete the selected recorder from the list. Press ***Done*** when all set-ups are complete.

FIGURE 7.5 FTP Recorder Setup requires IP address



In the ***Recorder Setup*** box enter the IP Address, if known. If the IP Address is not known click on ***Look up the IP address from the recorder name*** button. This will translate the recorder’s name to an address. Enter a description and click OK. The recorder’s address will be checked when a download is attempted.

Click on ***Look up the IP address from the recorder name***, to locate the recorder’s address from its network name myrecorder@company.net. Enter the name and click ***Find***, the address will appear if it has been found. Click on ***Use*** for the recorder to be added into the system. If unsuccessful, check the IP address, DSN server and Internet connections.

The other method is to select the “**Find Device**” button. This will search for all **X Series & GR** recorders on the network using their Network ID, eg **xs-nnnnnn** (where “nnnnnn” is the recorder’s serial number).

Give a name for the recorder. This should be something recognisable, all recorders should be given different names. Press OK.

On pressing “**OK**”, then “**Done**” you will return to the External Import dialog box as above.

Check that “**Setup only**” and “**from Network**” are still selected. Then drop down the list and select the recorder you have just added. The recorder name and IP address are in the list.

Finally select “**Import**”, **Trend Server** will download the setup from the recorder and this will be displayed in a setup window. Press **OK** and this recorder setup will be added to the recorder list.

Note: The recorder will be added to the list under the Recorder Name as set in the recorder itself. (This is the name that appears in the top right corner of the recorder screen when in normal logging mode) NOT the name you gave the recorder when setting up the FTP.

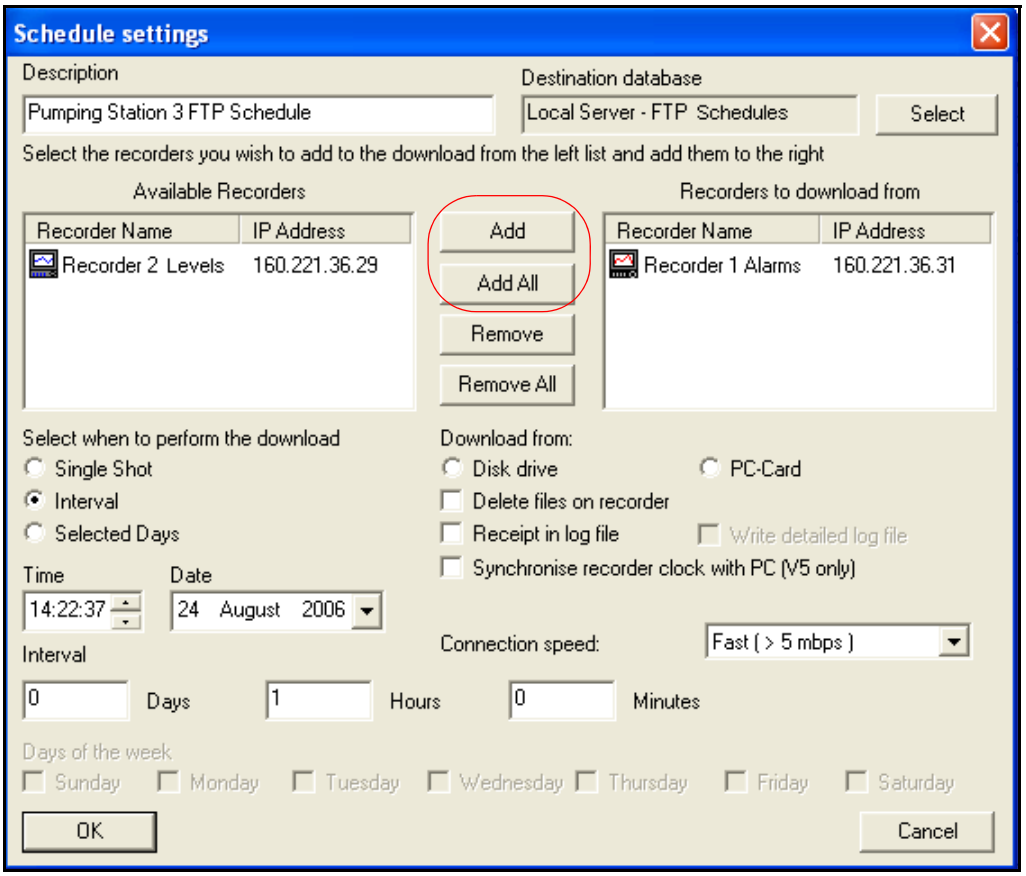
Batch set up

Use the ***Batch*** button to select a number of recorders required for importing via Network. All available recorders are displayed in the ***Batch Setup*** page, click on the Available Recorders in the window on the left, use the ***Add*** button to transfer that recorder to the Recorders in Batch window. Select OK when your selection for the batch list is complete. To start download return to the ***External Import*** box, select from the drop down list and click on 'Yes'.

Schedule Setup

Use the ***Schedule*** button to produce the ***Schedule Setup*** box. Use this to manage and download a list of selected recorders at specific times. This box will be empty on first use, click on ***Add*** for a new entry. This will generate the ***Schedule settings*** box used for adding and editing schedules. Existing schedules cannot be edited whist the schedule is active.

FIGURE 7.6 Schedule Settings



Description - User identifiable text for schedule recognition.

Destination Database - Database location where the FTP download will go to. Lists available servers and databases. Import operation cannot be done on the Archive Database. User cannot select Archive databases for FTP scheduler operation. Import operation cannot be done on the Archive Database. User cannot select Archive databases for FTP scheduler operation.

Add and Remove windows - The left window lists the recorders available and the right window lists the recorders that have been selected to download from. Use the Add/Add All and Remove/Remove All buttons to select and deselect recorders. Double clicking on a recorder in one window will transfer it to the other window.

Select when to perform the download - ***Single Import*** does the download once, ***Interval*** will download at a specific times on a specific day, these boxes become active when this option is enabled. Enter at what interval the down loads should take place. ***Selected Days*** reveals the days of the week at the bottom of the window so the recorder data can be downloaded on predefined days.

Download from - Select from the recorder's internal ***Disk drive***, ***PC card*** if fitted (***100mm and 180mm*** recorders). You can elect to delete the imported files on the recorder once the import has been successful.

Select the ***Delete files on recorder*** option so when the import is successful all the files will be deleted from that recorder, freeing the disk space.

Receipt in log file option will create a file in the program directory called shedlog.txt. This will hold all the schedule downloads when activated. This file can get quite big if used regularly.

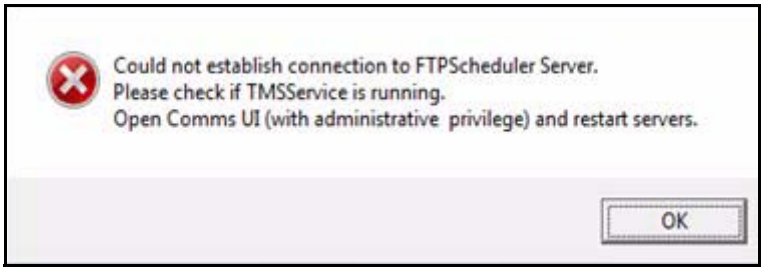
Write detailed log file will be available and will add more detail to the standard log file, this file can also become very large. Use with caution.

Synchronise recorder clock with PC, if there is more than five seconds difference between the recorder's clock and the PC then the recorder will update in line with the PC. This option is available only on **X & GR Series**recorders, not ***100mm and 180mm*** recorders.
*Floppy drive only available on the ***100mm recorder.***

Schedule Import

When all details are completed in the Schedule settings box press OK and return to the FTP scheduler setup box. Enable the scheduler and click on Done. No further action is necessary once the scheduler is active. Close the External Import box.

If the FTP/Secure Communication Interface related services do not start , this error message below will appear while opening ***Trend Server*** when scheduler is enabled.


Could not establish connection to FTPScheduler Server.
Please check if TMSService is running.
Open Comms UI (with administrative privilege) and restart servers.
OK

NB. If the FTP scheduler icon is enabled "Connection to TMSFtpScheduler is lost" message will be displayed in FTPstatus bar

See "General options" on page 155.

Realtime Communications

Only available with ***Trend Server*** software.

Ensure the hardware for the communications card is connected correctly, refer to the ***100mm and 180mm*** Communications manual for ***100mm thumb and 180mm***recorders. For **X Series & GR** recorders refer to the Comms section in the User manual.

Realtime Comms can be made via Ethernet, Modbus TCP/IP or Modbus RS485 connections. Trendbus RS485 is available on ***100mm thumb and 180mm*** recorders only. Only data can be sent via Modbus, so no recorder configurations or events are sent via Realtime and Logged data.

Due to the potential of large amounts of data that may be available it is not recommended to use FTP and Realtime at the same time.

Note: Please note that data logging continues even when user is logged off from the system.

NB. *Only Ethernet communications is available on the ***100mm recorder*** with directional key. RS485 communications is available on the **QXe, GR1** as an option. A communications card and an expansion card must be fitted in the recorder.

See *"Appendix E - Ethernet & E-mail" on page 287* for more information.

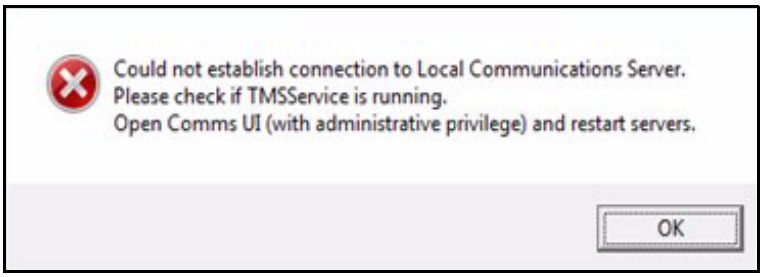
Communications Server

The Comms server software manages the communications status of a recorder across a comms port connection. Data can be configured for logging to a database and realtime data transferred direct through a client connection such as ***Trend Analysis*** software.

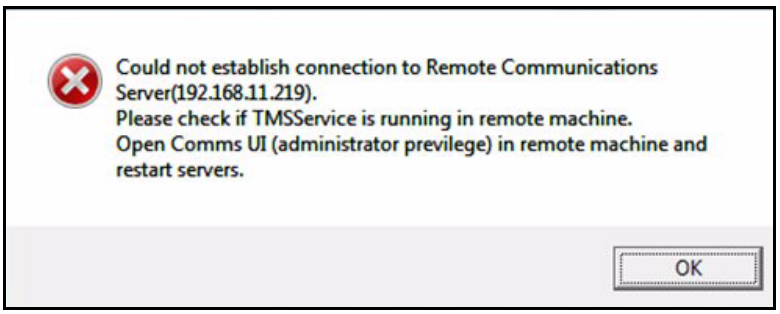
Note: The Comms Server is launched as a Service and need to make sure it is running to get real time and FTP data.

Recorders are added to the comms server via connections to communications ports. When recorders are entered, they can be configured for logging data to a database. When the data is logging, the recorder will appear in the database list. Databases can be added using the Database server. Realtime data is setup through the comms server showing client connections i.e. the ***Trend Analysis*** software, and comms port settings. Realtime logging can be done through the ***Trend Analysis*** software or through the comms server. All data, logged or realtime, can be interfaced directly from the comms server to the server application software (client connection). To access the ***Comms Server*** and ***Realtime***, ensure the recorders required have been added into the comms server.

If Comms Server related services have not been started you will see the below error message while opening TrendServer Pro.


Could not establish connection to Local Communications Server.
Please check if TMSService is running.
Open Comms UI (with administrative privilege) and restart servers.
OK

If Remote communication server is not running and the remote Comm Server is clicked from the "Comms Server" pane the following error message should pop up.


Could not establish connection to Remote Communications Server(192.168.11.219).
Please check if TMSService is running in remote machine.
Open Comms UI (administrator previlege) in remote machine and restart servers.
OK

For more detailed information on the Comms Server refer to the appropriate recorder Communications or User manual.

Communications Realtime Settings

- Select the ***System*** button from the left side of the main screen and click on the realtime icon, this will produce a window containing the realtime pen settings. All these settings are for realtime data only.
- From this box the default for the ***Data Rate*** and the ***Type*** of data can be set to either ***Sample*** or ***MaxMin***. Sample will log the actual data value of the last sampled reading. MaxMin will log the maximum and minimum values since the last log.
- Click in the Events box to retrieve and display event data, if required, then enter a default data rate time.
- Use the left mouse button to move the indicator on the ***Realtime Graphing Data Buffer Size*** indicator, from 10 minutes to 2 hours. This is the amount of data being displayed in the realtime data graph. To stop the realtime data scrolling, hit the ***Pause*** button, use the scroll bar at the bottom of the graph to review previous data, see *"Pause button" on page 223* and *"Realtime Data Buffer" on page 162.*

Click OK when the Realtime Pen Settings are complete.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Realtime Data Buffer

- The realtime data has a buffer of time which can be set by the user so a timed amount of data is stored in the buffer. This buffer is from 10 minutes to 2 hours, then the oldest data will disappear from the realtime graph.
- Go to the ***System*** button down the left side of the main screen, and select the realtime icon. *See "Communications Realtime Settings" on page 162.*

Realtime Comms logging

To configure a recorder for logging first click on the Realtime icon in the left hand toolbar on the Main screen. This will produce the Recorders slide out pane listing the available recorders for Realtime logging.

- Right click on the desired recorder and click on the Log icon to produce the Logging Configuration box for that particular recorder. The recorder details will be displayed showing the Port Number and the Device ID Number, check these match the recorder. If the information in the Logging Configuration box is empty check the Comms Server software to see if the connection is active between the recorder and the Comms server.

For more detailed information on the Comms Server refer to *"Comms Server" on page 183.*

For more information on Modbus communication refer to *“Appendix G - Modbus Communications and Modbus Profile Tool” on page 293*.

- The Database Configuration displays the Database Servers that are connected and the database currently being or to be logged to. Archived data server is not available for data logging hence no logging in Archived database (they are just for viewing and analysing)
- A list of Channels available to be logged will be displayed for that recorder, each channel can be added individually for logging or select all channels for logging. If all channels are selected then the log rate and the type of logging will be set the same for all, unless individually edited afterwards. Please ensure the log rate is set within the span allowed. Tick the right hand box if you require events to be logged to the database also.
- When the channels are selected for logging they will appear in the bottom window, displaying their log rate and the type of logging. To change this, first select a channel and click on the Edit Channel button to produce Logging Channel Configuration box, click OK. The Delete button will take the channel out of this window and put it into the window showing available channels for logging. Logging will stop for this channel. Apply the additions, deletions or changes before clicking on the OK button.
- A summary of the latest set of changes can be displayed by clicking on the Summary of all changes button.

Click OK on the Logging Configuration box when the channel setup is complete

To view the database go to the ***Recorder*** icon down the left side of the main screen, and select the database designated for that recorder.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Batch Mode

From the main menu bar the Batch button will open the Batch View window. This will display the Batch data for *all* the recorders in the currently selected database. Not available on ***Trend Viewer***.
Batch is a firmware option that can be activated using the credit system in the **X Series & GR**recorders.

Recorder Event/Batch Viewer

To view both Event and Batch information for a specific recorder, right click on a recorder in the Recorders list to reveal a toolbar. Select Batch or Events, both these buttons take you to the Events/Batch View.

For both the Events and Batch tabs the Device ID will be displayed in the Title bar if this tab is launched from the recorders list. If this is launched from the main menu tool bar the database will be displayed in the Title bar.

Events tab

The Events tab contains all recorded events for the selected recorder. The list contains an icon to show the type of Event, the Date/Time and Details of each Event.

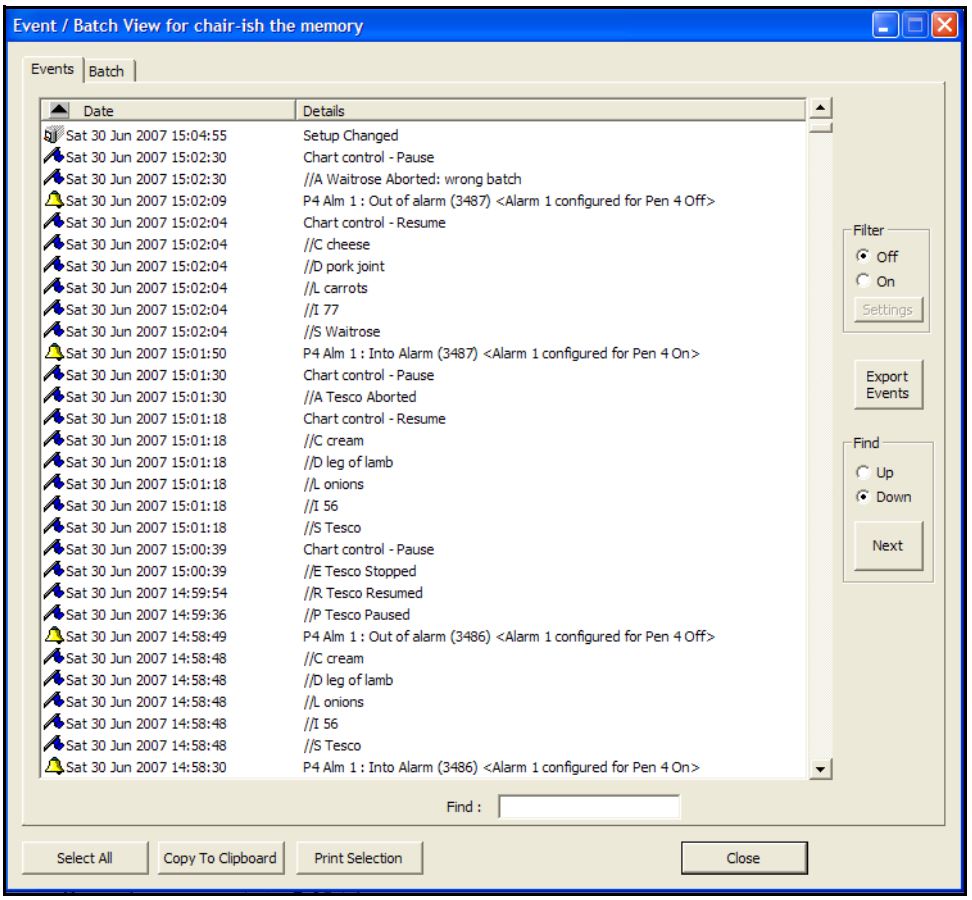
- World icon button - All events.
- Recorder icon button - System messages, general messages, diagnostics.
- Exclamation mark in a triangle - System warning, events
- Red circle with a red line through it - System warning.critical events
- Flag icon button - Automated messages, shows only automatic markers.
- Head icon button - Manually entered, shows only user defined messages.
- Yellow bell icon - Alarm events On or Off (yellow is an active alarm)
- Light bulb button - Digital and relay input events.
- Barcode icon - Batch event has occurred (see Batch tab)

The columns within the window can be resized by placing the cursor between the two columns in the headings, the cursor will change to a double arrow, then drag the cursor to the desired column width.

There is an arrow next to the Date heading that will reconfigure the list from ascending to descending date/time order and vice versa.

To view the full Events list drag the vertical scroll bar up and down or use the up and down arrows at the top and bottom of the scroll bar. Alternatively, use the arrow up and down arrow keys on your PC keyboard.

FIGURE 7.7 Event Tab


Event / Batch View for chair-ish the memory
Events
Batch
Date
Details
Sat 30 Jun 2007 15:04:55 Setup Changed
Sat 30 Jun 2007 15:02:30 Chart control - Pause
Sat 30 Jun 2007 15:02:30 //A Waitrose Aborted: wrong batch
Sat 30 Jun 2007 15:02:09 P4 Alm 1 : Out of alarm (3487) <Alarm 1 configured for Pen 4 Off>
Sat 30 Jun 2007 15:02:04 Chart control - Resume
Sat 30 Jun 2007 15:02:04 //C cheese
Sat 30 Jun 2007 15:02:04 //D pork joint
Sat 30 Jun 2007 15:02:04 //L carrots
Sat 30 Jun 2007 15:02:04 //I 77
Sat 30 Jun 2007 15:02:04 //S Waitrose
Sat 30 Jun 2007 15:01:50 P4 Alm 1 : Into Alarm (3487) <Alarm 1 configured for Pen 4 On>
Sat 30 Jun 2007 15:01:30 Chart control - Pause
Sat 30 Jun 2007 15:01:30 //A Tesco Aborted
Sat 30 Jun 2007 15:01:18 Chart control - Resume
Sat 30 Jun 2007 15:01:18 //C cream
Sat 30 Jun 2007 15:01:18 //D leg of lamb
Sat 30 Jun 2007 15:01:18 //L onions
Sat 30 Jun 2007 15:01:18 //I 56
Sat 30 Jun 2007 15:01:18 //S Tesco
Sat 30 Jun 2007 15:00:39 Chart control - Pause
Sat 30 Jun 2007 15:00:39 //E Tesco Stopped
Sat 30 Jun 2007 14:59:54 //R Tesco Resumed
Sat 30 Jun 2007 14:59:36 //P Tesco Paused
Sat 30 Jun 2007 14:58:49 P4 Alm 1 : Out of alarm (3486) <Alarm 1 configured for Pen 4 Off>
Sat 30 Jun 2007 14:58:48 //C cream
Sat 30 Jun 2007 14:58:48 //D leg of lamb
Sat 30 Jun 2007 14:58:48 //L onions
Sat 30 Jun 2007 14:58:48 //I 56
Sat 30 Jun 2007 14:58:48 //S Tesco
Sat 30 Jun 2007 14:58:30 P4 Alm 1 : Into Alarm (3486) <Alarm 1 configured for Pen 4 On>
Filter
Off
On
Settings
Export Events
Find
Up
Down
Next
Find :
Select All
Copy To Clipboard
Print Selection
Close

The ***Filter*** option, when switched ***On***, will activate the ***Settings*** button. ***Date/Time*** will activate a drop down menu to select a time span. ***Event Type*** will activate a drop down menu listing all types of Events

Use the ***Filter*** option to display only the events that are required to avoid a long list of unnecessary information.

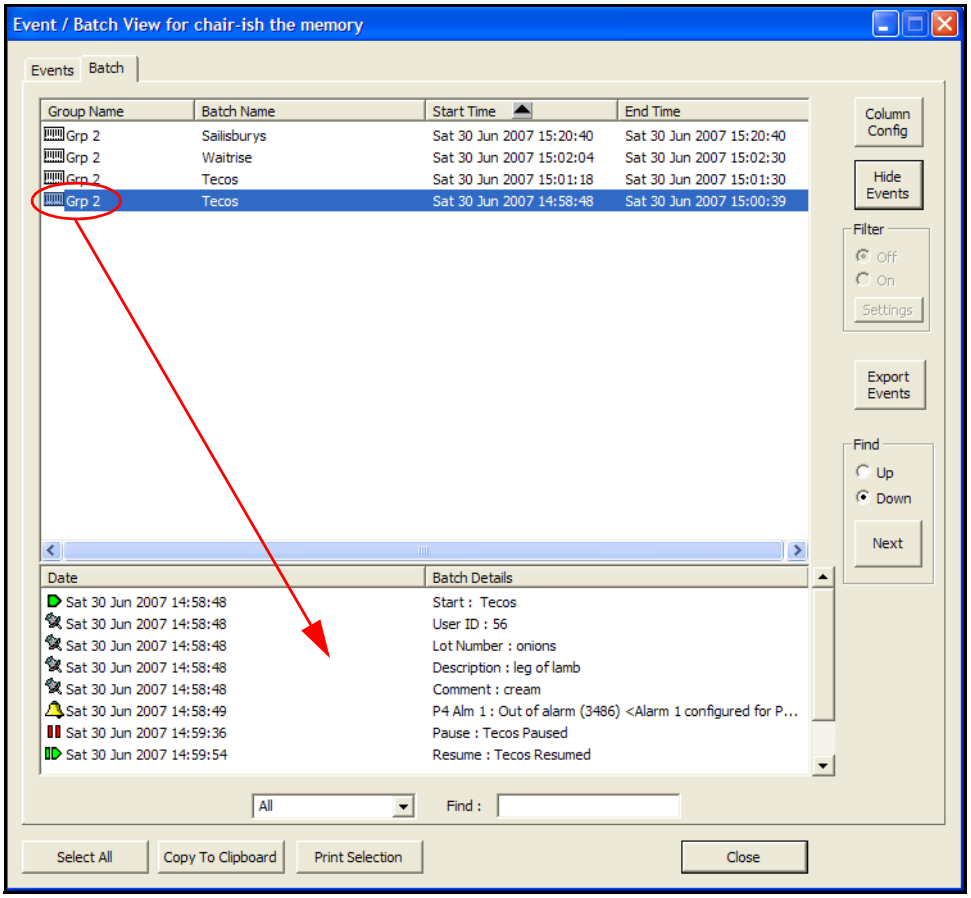
The ***Find*** buttons, ***Up*** and ***Down,*** are for use with the ***Find*** text entry box at the bottom of the window. Enter text in the box and select to search ***Up*** or ***Down*** the list using the ***Next*** button.

The ***Find*** text entry box is for locating text that would have been entered as a Event Marker. Enter the text you want to search for in the ***Find*** text entry box. The search will start on the top line downwards. Select whether to search ***Up*** or ***Down*** the list then press the ***Find*** button.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

Batch tab

FIGURE 7.8 Batch Tab


Event / Batch View for chair-ish the memory
Events
Batch
Group Name
Batch Name
Start Time
End Time
Grp 2 Sailisburys Sat 30 Jun 2007 15:20:40 Sat 30 Jun 2007 15:20:40
Grp 2 Waitrise Sat 30 Jun 2007 15:02:04 Sat 30 Jun 2007 15:02:30
Grp 2 Tecos Sat 30 Jun 2007 15:01:18 Sat 30 Jun 2007 15:01:30
Grp 2 Tecos Sat 30 Jun 2007 14:58:48 Sat 30 Jun 2007 15:00:39
Column Config
Hide Events
Filter
Off
On
Settings
Export Events
Find
Up
Down
Next
Date
Batch Details
Sat 30 Jun 2007 14:58:48 Start : Tecos
Sat 30 Jun 2007 14:58:48 User ID : 56
Sat 30 Jun 2007 14:58:48 Lot Number : onions
Sat 30 Jun 2007 14:58:48 Description : leg of lamb
Sat 30 Jun 2007 14:58:48 Comment : cream
Sat 30 Jun 2007 14:58:49 P4 Alm 1 : Out of alarm (3486) <Alarm 1 configured for P...
Sat 30 Jun 2007 14:59:36 Pause : Tecos Paused
Sat 30 Jun 2007 14:59:54 Resume : Tecos Resumed
All
Find :
Select All
Copy To Clipboard
Print Selection
Close

The ***Column Config*** button produces a box in which you can add and remove the type of Batch information you wish to view. Eg. Comment, Batch Description, Lot Number, User Data or User ID.

The ***Show/Hide Events*** button toggles an individual batch view window on and off, as shown in *Figure 7.9 on page 167.* Select a batch from the main view to display associated events that have occurred during the batch.

The ***Filter*** option, when switched ***On***, will activate the ***Settings*** button. ***Date/Time*** will activate a drop down menu to select a time span. ***Batch Name*** will activate a drop down menu to select batches to view ***From*** a specified batch name ***To*** a specified Batch name. ***Device ID*** is only active when the batch button is selected from the main tool bar, not the recorder tool bar. From the main tool bar the list of batches are for all recorders. Device ID will activate a drop down menu with all recorders listed for that database.

Export Events button will produce a dialog box where copy of the Batch data can be exported and saved as an Excel spreadsheet.

The ***Find*** section is for searching through text in Event Markers for specific Batch informatin. Make a selection from the left hand box for the type of batch information you are searching for, All, Name, Description, Comment, User ID, User Data, or Lot No. Then enter the text you want to search for in the right hand window. The search will start on the top line downwards. Select whether to search ***Up*** or ***Down*** the list then press the ***Find*** button. You may use a barcode reader to enter the same batch information as used on the factory floor.

For more details on Setting up Events, Event Markers, Counters, E-mailing and Viewing Events, see *See "Events System" on page 135*. To find out more about how events can be graphed, see *"Graphing Events" on page 213.*

Exporting data to a spreadsheet

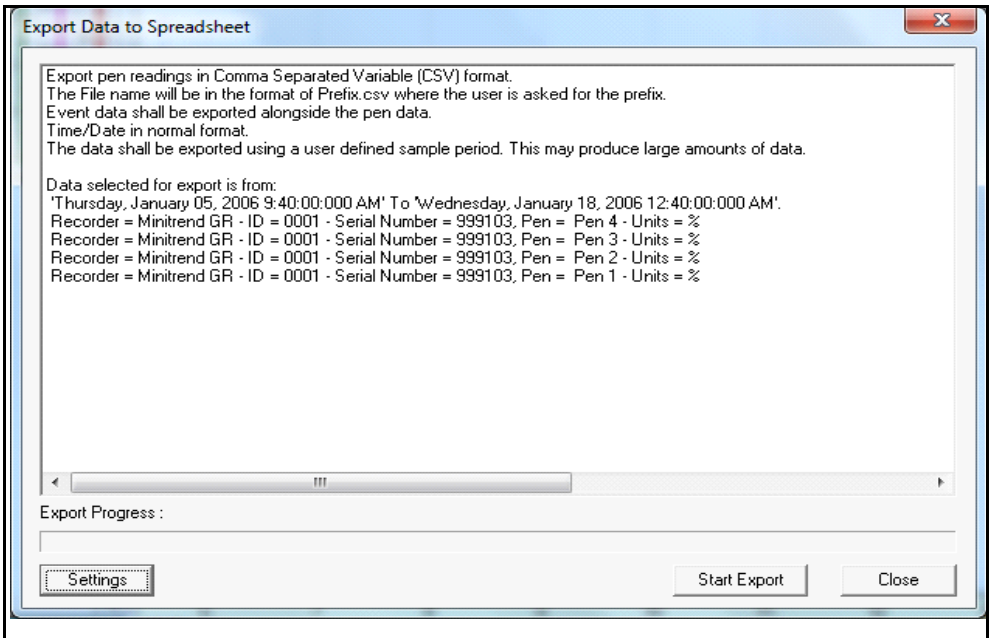
Available only on ***Trend Manager*** and ***Trend Server***.

The ***Spreadsheet Export*** button is found on the left side of any graph, and will allow the user to export data from a graph to a spreadsheet package such as Excel or to an E-mail.

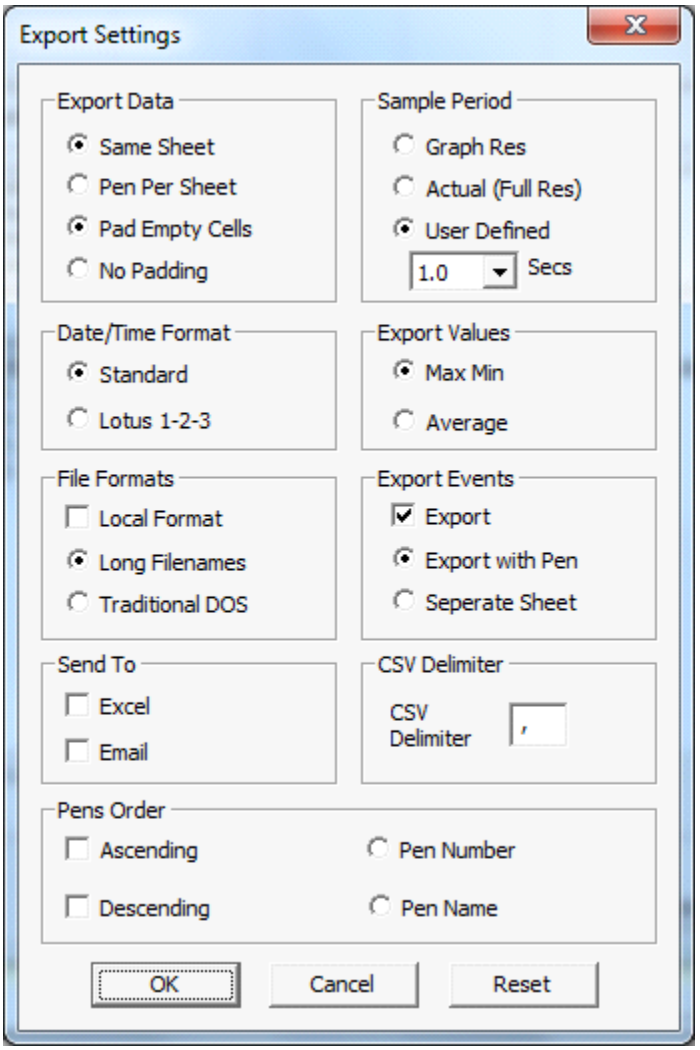
Data can be exported from any existing graph, Historic FTP or Historic Realtime, or a specific Batch graph. Only the data displayed in the graph area will be exported to the spread sheet. A graph can be created by dragging a recorder from the recorders list onto the graphing area or by dragging a Batch from the Batch Viewer.

1. Click on Spreadsheet Export button. Click on "Yes", to start preparing export summary and produce the Export Data to Spreadsheet window.

FIGURE 7.9 Export to Spreadsheet settings


Export Data to Spreadsheet
Export pen readings in Comma Separated Variable (CSV) format.
The File name will be in the format of Prefix.csv where the user is asked for the prefix.
Event data shall be exported alongside the pen data.
Time/Date in normal format.
The data shall be exported using a user defined sample period. This may produce large amounts of data.
Data selected for export is from:
'Thursday, January 05, 2006 9:40:00:000 AM' To 'Wednesday, January 18, 2006 12:40:00:000 AM'.
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 4 - Units = %
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 3 - Units = %
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 2 - Units = %
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 1 - Units = %
Export Progress :
Settings
Start Export
Close

2. Click on the Settings button to produce the Export Settings window which is a list of default settings that will determine how the data is displayed on the spreadsheet for a quick export.
3. Click on "Ok" if all the settings are ok or modify as necessary and then click on Ok. Click on "Reset" if you want to preserve old settings or on "Cancel" to keep as it is.



Export Settings

Export Data

Same Sheet - Exports data for all Pens to one spread sheet
Pen Per Sheet - Exports data for each pen to an individual spreadsheet
Pad Empty Cells - Displays all the data for the pen with the fastest sampling speed and pad the empty cells with the previous reading for the pens with slower sampling speeds. Padding will commence when the first reading of the slowest pen has been taken, also pads when no data is being logged.
No Padding - Will not fill in the empty cells but leave breaks

Date/Time Format

Standard will display standard date and time format as text.
Lotus 1-2-3 - Export files in Lotus 1-2-3 format. Lotus format is the number of seconds elapsed since 1970. Can be applied to graphing or to display in Excel format.

File Formats

Local Format - Exports using non decimal format if the users PC is set up that way. Uses the native format for that country.

Long Filenames - Attaches a tag to the beginning of the file name and an extension to the end of each pen exported to include the recorder name and pen name.

Traditional DOS - This is a naming format which allows the user to enter a six character tag which has the trace number attached to the end of the file name. Used on older type of networks.

Send To

Excel - Exports to Microsoft™ Excel 97 or later. Auto starts with the exported files.

E-mail - PCs using a MAPI compliant E-mail programme e.g. Outlook, Outlook Express etc., will open the E-mail programme automatically, creating a new e-mail with the selected files attached.

Sample Period

Graph Res - Exports the data dependant on the graph resolution displayed. This gives an overview of the actual data to reduce the length of the spread sheet.

Actual (Full Res) - Takes the fastest logging speed and exports every data point. One pixel on the graph is represented by two values, min and max. If the spread sheet should exceed over ten thousand lines a warning box will appear.

User Defined - Select a sample period from the drop down box. The export function will look for multiple readings over the selected time.

Export Values

Max Min - Default setting which will log the Max and Min values since the last log.

Average - Can be set to take an average of all the samples taken since the last log

Export Events

Export with Pen - Event information will be exported to the same spreadsheet as the data.

Separate Sheet - List of Events exported to a separate spreadsheet

CSV Delimiter

Comma Separated Variable (CSV) is used to identify breaks between values so they can be displayed correctly. If local values already use commas as a part of a currency format then change the setting to a semicolon. The software will detect which local currency format is in use.

Pens Order

Set the order of the pens when doing an export in TrendManager

Ascending - Ascending will display the Pen Number/Pen Name as per selection in Ascending order.

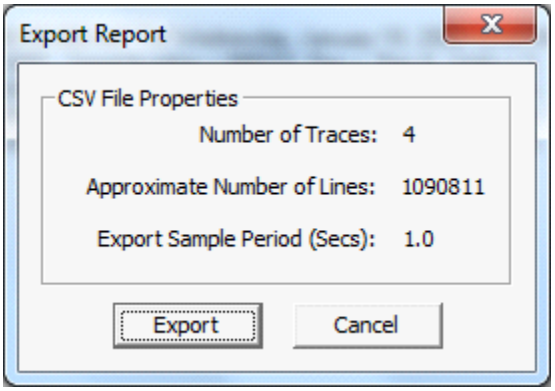
Descending - Descending will display the Pen Number/Pen Name as per selection in Descending order.

Pen Number - Pen Number allows the user to arrange pen data as per pen Number.

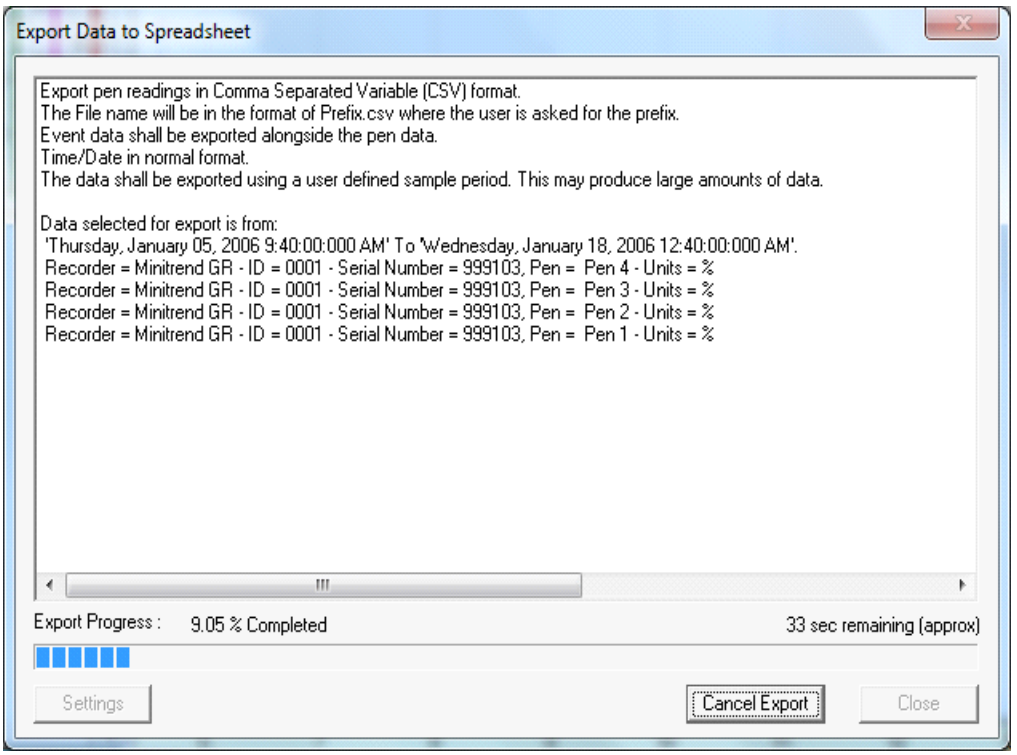
Pen name **-** Pen Name allows the user to arrange pen data as per Pen Name.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

4. Click on "Start Export", it will calculate export volume and shows Export Report Window having information about CSV file properties and they are 'Number of Traces', 'Approximate Number of Lines' and 'Export Sample Period'.



5. Click on "Export" button, it will start exporting by showing export progress and time remaining (approx) to complete it.


Export Data to Spreadsheet
Export pen readings in Comma Separated Variable (CSV) format.
The File name will be in the format of Prefix.csv where the user is asked for the prefix.
Event data shall be exported alongside the pen data.
Time/Date in normal format.
The data shall be exported using a user defined sample period. This may produce large amounts of data.
Data selected for export is from:
'Thursday, January 05, 2006 9:40:00:000 AM' To 'Wednesday, January 18, 2006 12:40:00:000 AM'.
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 4 - Units = %
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 3 - Units = %
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 2 - Units = %
Recorder = Minitrend GR - ID = 0001 - Serial Number = 999103, Pen = Pen 1 - Units = %
Export Progress : 9.05 % Completed
33 sec remaining (approx)
Settings
Cancel Export
Close

6. Click on "Cancel Export", if export operation need to be cancelled
7. Once on export complete, export progress will show it is completed.
8. Click on "Close" on Export Data to Spreadsheet window to close the window.

System status

All the areas listed below are covered in the ***Trend Analysis Software* Help.**

Available only on ***Trend Server***.

Activate this button to reveal four more options.

Password

Password control allows an Administrator to manage password accounts. These accounts have a user name and password with different levels of authority which restrict access to the more system orientated areas of the program. For more information, see *"Passwords" on page 173.*

Status

The status button toggles the system information panel on or off, this shows a list of text messages linked reporting major events in the system.

E-Mail

The E-mail function is for setting up default accounts and destinations for any part of the program that uses E-mail. This is for use when exporting to spreadsheets.
Also see *"Event Email setup" on page 144.*

Realtime

This is the ***Realtime Pen Settings*** dialogue box configuring pens for realtime logging. Enter the ***Data Rate*** and the ***Type*** of data to be logged, either ***Sample*** or ***MaxMin***. Sample data will log the actual data value of the last imported reading, Max/Min will log the maximum and the minimum values since the last log. There are a list of rules concerning priorities for data rate and data type when accessing a recorder on line. Refer to the Communications manual for ***100mm and 180mm***recorders, for **X Series and GR** recorders refer to the Comms section in the User manual.

For more detailed information on the Comms Server refer to the Communications manual for ***100mm and 180mm*** recorders, for **X Series and GR** recorders refer to the Comms section in the User manual.

Server

Available only on ***Trend Server***.

All the areas listed below are covered in the ***Trend Analysis Software*** Help and in the ***Trend Analysis Software***User manual.

Click on this button to produce the LocalServer, Archive Database Server both by default and Remote database server list if any added. From here the user can access the ***Database list*** by clicking on ***Databases*** . Select a server and close the list, all the recorders and databases that will be displayed will be held on that selected database server.

For more information on server access refer to the *"Server access table." on page 153.*

Archive Database Server

This server will allow a user to add databases which are archived using the Data Management Tool. This server will allow the flexibility to add archive databases located across the network machines even though ***Trend Server*** is not installed in those machines. This server will happen by default after installation of ***Trend Server***.

NOTE: There can be multiple databases with the name "initial database" under the Archive Database Server. This occurs because when the database is archived using the Database Management Tool, the default database name is not modified. To modify the default database name please use the Database Management Tool.

After adding archive databases, if any new database folder is added to the same path, it will not be reflect automatically in the ***Trend Analysis Software***user interface. You will need to close and launch ***Trend Analysis Software***user interface to see the newly added database.

Add a Remote Server

- Go to the ***Server List*** in the ***Server slide-out pane*** (only connected servers listed).
- Click ***Add new server.***
- Enter the remote machine's IP address and name into the dialogue box. Or use this button 'Look up the IP address from the machine name' to translate a name to an address. Click on OK.

If the new server icon appears with a red cross on it, this means that there has been a link problem. Verify that the IP address is correct and the machine is turned on. See the message window at the bottom of the screen for details. Double click on the server icon to retry the connection. Double click on the server icon to reload all of that server's databases.

Depending on your version of Microsoft windows, some settings in the permissions parameters might be necessary. Please refer to the application notes if necessary for more details

Delete a server

- Go to the ***Server list*** in the ***Server slide-out pane.***
- Either drag and drop the selected server icon over the nearest ***Trash can*** or right click and select delete.
- Archived Database Server cannot be deleted.

Change the current Server

- Go to the ***Server list*** in the ***Server slide-out pane.***
- Click on the desired server, this will now be the currently selected server.

Passwords

Only available from ***Trend Server,*** setting up passwords allows the user to restrict access to certain parts of the program.

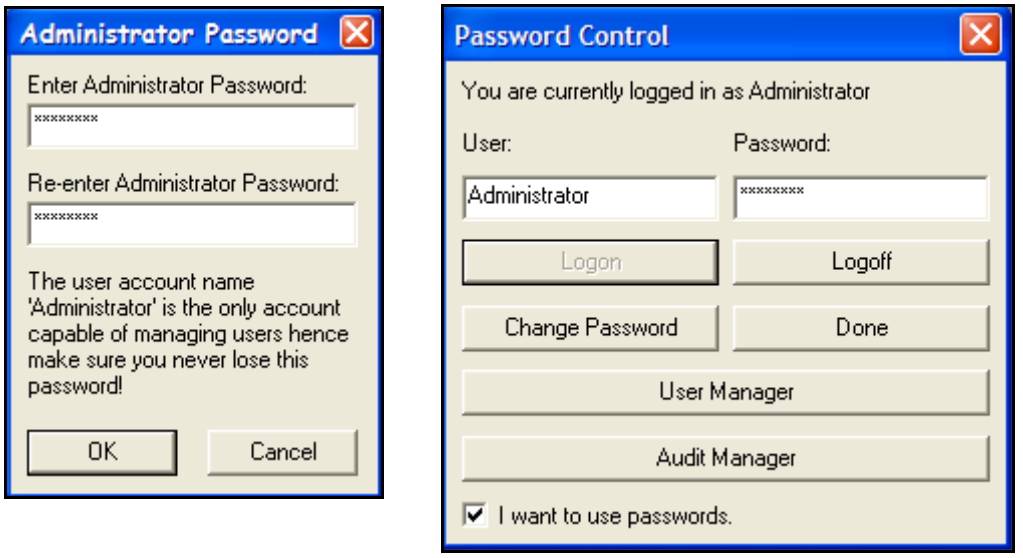
Click in any area on the screen and press F1 on the keyboard to display the related help files.

Click on the ***System*** button to reveal the ***System list,*** select the Password icon. If the passwords have not been used before, the user will be prompted with the ***Initial Password Setup*** box. Enter a password of your choice, twice. Press OK and the ***Password Control*** box will appear.

Password Control

Enter your user ID as Administrator and your password, then select ***Logon***. The maximum number of characters is 20, it is case sensitive and it can be alpha numeric. From this screen the Administrator can ***Logoff***, ***Change Password***, select the ***User Manager*** or deselect the box to disable the password system.

FIGURE 7.10 Password Settings



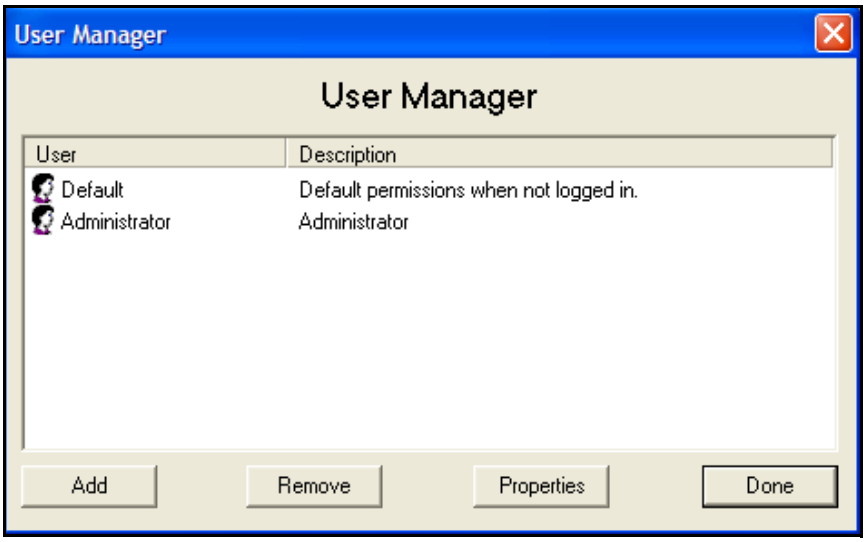
Change Password

To change a password, select Change Password and enter the new password twice. This can only be done by the Administrator.

Password User Manager

The User Manager screen is designed to add, remove and edit passwords and password access. There are two users already loaded into the password system, these are known as password accounts. The ***Default*** account is when no users are logged on and access is kept to a minimum. The Administrator account is recommended to be kept with full access.

FIGURE 7.11 Password Manager



To ***Add*** or ***Change*** the properties of a user select this button from the ***User Manager*** screen and click on Add or Properties. This will reveal the ***User Properties*** box.

To add a new user make sure nothing is selected in the box and click on Add. Enter the User's Name, a Description for identification and the Password, twice. To change the properties of an existing user, select the user from the User Manager and click on properties. *See "Password access table" on page 175*.

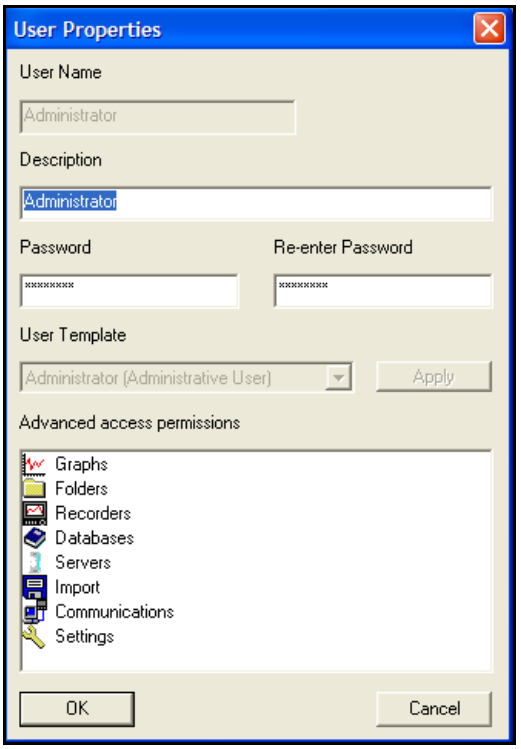
The ***User Templates*** allow access permissions to pre-set commonly used configurations. Select a template and click on Apply.

Use the ***Advanced access permission*** for setting up a user to a specific profile not supported by the templates. Double click on an area to reveal the categories available for access. Boxes will be marked to show which categories can be accessed for each particular template. Tick any extra boxes as required. Press OK when all categories have been selected and the users required password access is complete.

When the Administrator is logged off the password system is in the Default state. The Administrator and the Power User have access to the same areas apart from the Administrator can setup and manage the password accounts and has access to the Audit Manager.

The Administrator is the only one who can disable the password system.

FIGURE 7.12 Password Properties



If the password gets lost contact your supplier for help. Contact number and address is in the ***Help*** file under ***Contact information***.

Password access table

Access permissions available		Guest User	Basic User	Standard User	Power User	Default	Admin-istrator
GRAPHING	Open	✓	✓	✓	✓	✓	✓
	Rename		✓	✓	✓		✓
	Delete		✓	✓	✓		✓
	Print	✓	✓	✓	✓	✓	✓
	Export data from		✓	✓	✓		✓
	Graph Events		✓	✓	✓		✓
	Add		✓	✓	✓		✓
	Copy		✓	✓	✓		✓
	Move		✓	✓	✓		✓
	Save		✓	✓	✓		✓
FOLDERS	Create		✓	✓	✓		✓
	Rename		✓	✓	✓		✓
	Copy		✓	✓	✓		✓
	Delete		✓	✓	✓		✓
RECORDERS	Add			✓	✓		✓
	Copy			✓	✓		✓
	Delete			✓	✓		✓
	Edit Rec Setup			✓	✓		✓
	View Events			✓	✓		✓
	Print Rec Setup			✓	✓		✓
	Web Browse			✓	✓		✓
	Upload Setup				✓		✓
DATABASE	Add			✓	✓		✓
	Change		✓	✓	✓		✓
SERVER	Add				✓		✓
	Delete				✓		✓
	Change				✓		✓
IMPORT	Disk Import Data			✓	✓		✓
	FTP Import Data				✓		✓
	Disk Import Setup			✓	✓		✓
	FTP Import Setup				✓		✓
COMMUNICATIONS	Add Server				✓		✓
	Delete Server				✓		✓
	Change Server				✓		✓
	Status Window			✓	✓		✓
	Configure Logging			✓	✓		✓
	Graph Realtime data			✓	✓		✓
SETTINGS	E-Mail			✓	✓		✓
	Comms Admin				✓		✓
	Realtime			✓	✓		✓

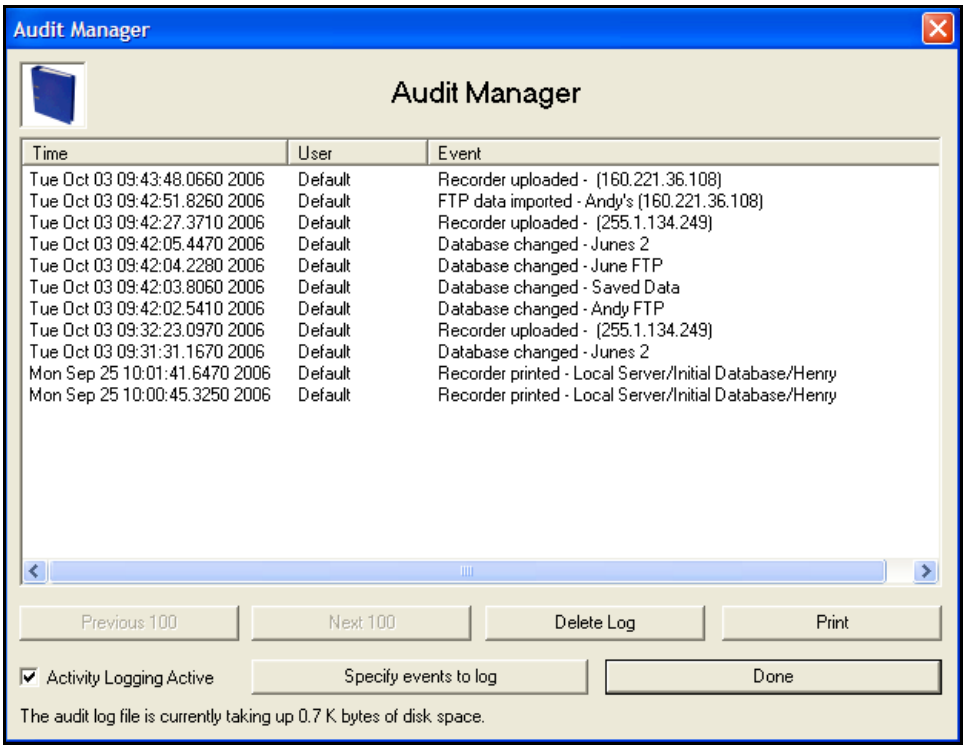
Audit Manager

The Audit Manager is only available on ***Trend Server***, and is accessed through the password system at Administrator level only. The Audit Manager facility allows the Administrator to configure, log and view all actions that have occurred within the software.

Click on the ***System*** button on the main screen tool bar and select ***Passwords***. Only the Administrator logon reveals the Audit Manager option.

The Administrator can specify which actions get logged to the Audit trail.

FIGURE 7.13 Audit Manager


Audit Manager
Audit Manager
Time
User
Event
Tue Oct 03 09:43:48.0660 2006 Default Recorder uploaded - (160.221.36.108)
Tue Oct 03 09:42:51.8260 2006 Default FTP data imported - Andy's (160.221.36.108)
Tue Oct 03 09:42:27.3710 2006 Default Recorder uploaded - (255.1.134.249)
Tue Oct 03 09:42:05.4470 2006 Default Database changed - Junes 2
Tue Oct 03 09:42:04.2280 2006 Default Database changed - June FTP
Tue Oct 03 09:42:03.8060 2006 Default Database changed - Saved Data
Tue Oct 03 09:42:02.5410 2006 Default Database changed - Andy FTP
Tue Oct 03 09:32:23.0970 2006 Default Recorder uploaded - (255.1.134.249)
Tue Oct 03 09:31:31.1670 2006 Default Database changed - Junes 2
Mon Sep 25 10:01:41.6470 2006 Default Recorder printed - Local Server/Initial Database/Henry
Mon Sep 25 10:00:45.3250 2006 Default Recorder printed - Local Server/Initial Database/Henry
Previous 100
Next 100
Delete Log
Print
Activity Logging Active
Specify events to log
Done
The audit log file is currently taking up 0.7 K bytes of disk space.

The Audit manager provides an Audit trail from when a User logs on, showing the time and date, to what actions the user performs within the software including changes to:

- Graphing (adding, deleting, copying, printing moving, exporting etc).
- Recorder setup, hardware added or deleted.
- Importing data, setups.
- System changes, adding or deleting Databases or Servers.
- Adding, deleting or copying Recorders and Folders.
- Setting changes, E-mail, LogOn/Off, Passwords.
- Events Log for Comms - Status window, Configure logging, Adding/Removing Comms Server. ***100 & 180mm*** recorders only.

In order to log User's actions, the ***Activity Logging Active*** box should be checked.

The print button prints a document of all the currently loaded 100 (or less) actions.

Delete log will remove all of the Audit trail.

Specify which events to log

The ***Specify events to log*** button produces the ***Audit settings*** page which enables the administrator to determine which actions to log. Double click to reveal the contents of each heading, click on each item to select or deselect. Each ticked item will be logged to the Audit Manager.

FIGURE 7.14 Audit Settings

Trend Server with OPC Server

The OPC Server option provides the same functions as ***Trend Server*** but includes the added function of an integrated OPC Server to make it easier to interface third party HMI software packages that support an OPC client. This provides a realtime interface between servers and clients. The OPC Server in the ***Trend Server*** software is OPC 2.0 DA compliant and for the **X-Series** recorders use a OPC 3.0DA and Alarm & Events 1.1 OPC Server for direct connection to the recorders..

OPC is a firmware option that can be activated using the credit system in the **X-Series** recorders.

OPC Server

The OPC Server is automatically registered when the package is installed and is available from within the client package as “Trendview.OPC.1”

When using an OPC Client to connect to the TrendServer OPC Server Version 100.1.0 or higher you will need to add the OPC client user to the“TMSApplicationAccessGroup” if this has not already been done. Refer to Chapter 3 Installation for more details

To construct a Pen tag the user can browse if available with the client package. The recorders will be grouped under the communications port that they are connected to, COM 1 to 8 and Ethernet. A list of recorders will be displayed under each port and within each recorder list of available pens. Constructed port.recorder.pen.tag e.g. Ethernet.Rec 0002.Pen 1.CV.

Please refer to 43-TV-25-41, Trendview Historian User Guide, for information on the Trendview Historian software which uses OPC HDA to obtain data.

Each pen has 6 Tags available which are:

1. CV - the current process value
2. Zero - Bottom of scale in engineering units
3. Span - Top of scale in engineering units
4. Low EU - Absolute bottom of engineering scale (inc 4% under range)
5. High EU - Absolute top engineering scale (inc 4% over range)
6. Units - Units of engineering values as Text field.

Both Asynchronous and Synchronous modes are supported.

OPC Clients

An OPC client can be used instead of the **Trend Server** software. It is a user software application for realtime interface between servers and clients. Information from our comms server, which is OPC compliant, uses an industry standard method of uniform data interchange. The OPC client can then export realtime communications to other applications, eg. Microsoft™ Excel. OPC clients must be version 3 compatible.

For more information refer to Application Note 4 - OPC Access.

OPC Interface - Open Process Control

OPC Server connection must be enabled in the recorder by selecting the OPC option in *"Credits tab" on page 62.* Many types of OPC Server software packages are available and are compatible with the recorders. OPC server supports OPC DA version 3 and OPC AE (Alarm and Events). Use the name of the OPC server as it appears in the client software.

OPC limitations

Technically speaking there are no restrictions on the number of clients that can connect to OPC DA or OPC A&E servers. Some software limits are in place:

OPC DA Server

Maximum number of groups that can be added per client is 3.

Maximum number of unique items that a OPC DA server supports is 100. I.e.(Number of pens + Number of totalisers + Number of communication variable) spread across 3 groups per client. Recommended number of clients that can connect a OPC DA server is 3.

OPC A&E Server

Number of active alarm that is maintained at a given time is 576. Includes pens having active alarms and pens which have normal but unacknowledged alarms if latch enabled.

Recommended maximum number of event subscriptions is 3

Not only can pen and alarm values be imported from the recorder but CV values can be sent to the recorder from the OPC software.

How OPC works

When data acquisition devices conform to the OPC standard, you can use them with any OPC-enabled software application, and vice versa. You can therefore easily combine different devices from different manufacturers in one system. OPC gives you the freedom to add new hardware from third-party vendors to existing set-ups, or to replace a device, without worrying about compatibility with your chosen software.

The measurement and control hardware, such as a recorder, provides front-line data acquisition. As soon as the hardware device has collected the data it makes it available to software applications running under Windows. It presents the data according to the OPC standard, and is thus known as an OPC server. Each OPC server offers data in the same way. If the software application can understand the OPC format it can therefore access data from any OPC server device, making individual drivers for each piece of equipment obsolete.

OPC-enabled software include spread sheets, databases, virtual instruments and SCADA (supervisory control and data acquisition) interfaces. These applications are known as OPC client software.

Each OPC server can simultaneously provide data for any number of OPC clients. Likewise multiple clients can at the same moment access any server: a robust method of communication. With OPC, measurement and control systems can share information and co-operate with other installations across factories, offices, laboratories, etc. The same data is therefore readily available to engineering, maintenance, management...in fact to anyone that requires up-to-the-minute data on which to base their decisions.

OPC allows "plug-and-play". All OPC devices will connect together and immediately work with the OPC client software. This has the potential to massively reduce installation and system configuration time. It also means that you can add devices without shutting down existing systems.

OPC offers the following:

- Combine different devices from different manufacturers in one system
- Reduce installation time
- Add devices without stopping existing software and systems
- Quickly replace a device from one vendor with one from another
- Share information around networks
- Device drivers rendered obsolete
- Factory, laboratory and office applications can all access the same data
- Reliable data as any number of OPC software applications can simultaneously read a device
- Single, industry-standard, data interface

Web Browser

The Web Browse function can be enabled/disabled from the recorder. The web function can be password protected if passwords are enabled.

To access the web page, type the device's IP address in to a web browser such as Internet Explorer. If Microsoft™ WINS system (Windows Internet Name Service) is available then the device name can be used to search for the device web page.

The recorder will automatically register a unique Network ID using the serial number. The format is **xs-nnnnnn**, where nnnnnn is the serial number of the recorder. This allows you to browse the recorder if you are using DHCP (Dynamic Host Configuration Protocol).

A Login Screen will appear for recorders with Password functionality enabled. Enter the password protected User name and Password supplied to log in here. For Users without Password security just choose a language option to access the web page.

IP Address Troubleshooting

If your recorder's IP address begins 169.***.***.*** this means there is no DHCP Server (Dynamic Host Configuration Protocol) available to create a dynamic IP address. Either, make a DHCP server available or allocate a Static IP address, see *"TCP/IP tab" on page 92.*

The recorders IP address can also be viewed in the recorder's Status menu.

Internet Security Settings

Types of web browser for use with the Remote Viewer include Internet Explorer 5 and above. To browse multiple recorders, IE8 or higher version is required

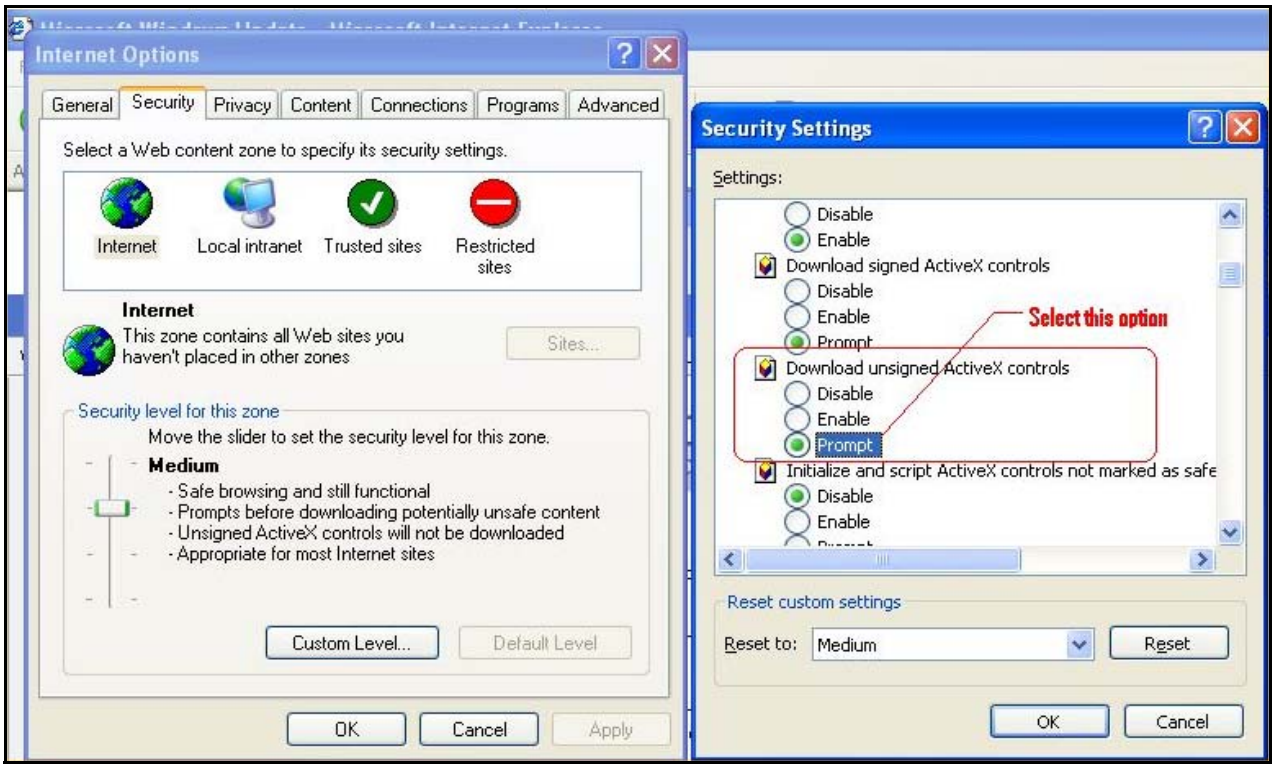
Figure 7.10, "Internet Security," on page 181 shows an example from Internet Explorer 6 on a Windows™ XP machine. The settings shown are for Internet access. If the device is to be accessed in an intranet scenario then the same has to be done for local intranet option.

Firewall settings

If this device is sitting on an enterprise network with a firewall in place then the firewall should be configured to allow all requests on port 80 and port 976 (for remote control activeX). There is also one port for FTP control and one for OPC, which should be opened.

Access to the firewall settings will differ depending on what firewall is installed.

Figure 7.10 Internet Security



Chapter 8: Comms Server

Communications Server

Comms Server Overview

The Comms server will enable the user to:

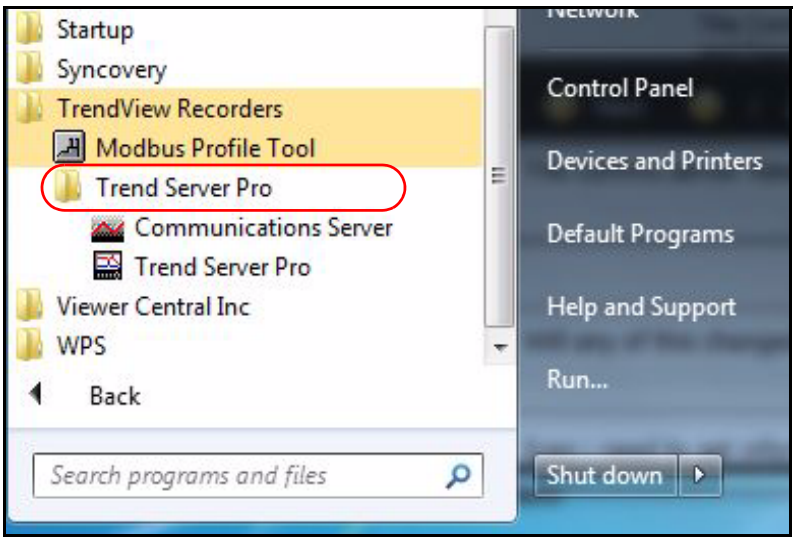
- Monitor the status of communications with a device on any serial port, up to 8 ports and an Ethernet connection.
- Connect to local and remote databases
- Set up local and remote servers
- Modbus protocols supported on Ethernet and Serial ports
- Enable and disable ports
- Add, edit and remove devices
- Log to database or client connections, local or OPC client.

Comms Server - Start up

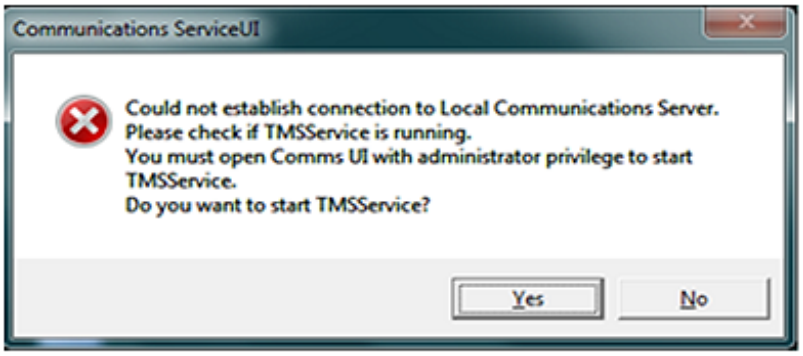
The Comms server can be opened using the Start Menu of your PC, follow the path shown below.

Start -> All Programs -> ***100mm, 180mm &* X Series** Recorders > ***Trend Server***

Select Communications Server, then once opened it will appear as an icon in the system task bar in the bottom right of the PC Screen.
Note: Data will not be gathered until the Comms Server is activated from the Start Menu.

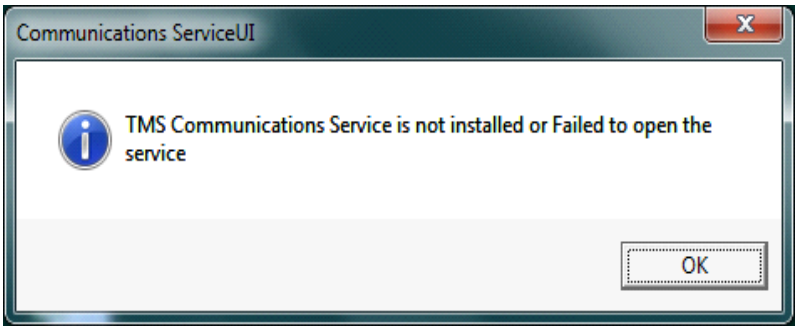


If the Comms Server related services does not start, and if the Communications Service UI is not open, while starting the Communications Service UI (User Interface) a covering window in task bar will appear. Subsequently, after few seconds an error message box, shown below, will appear.

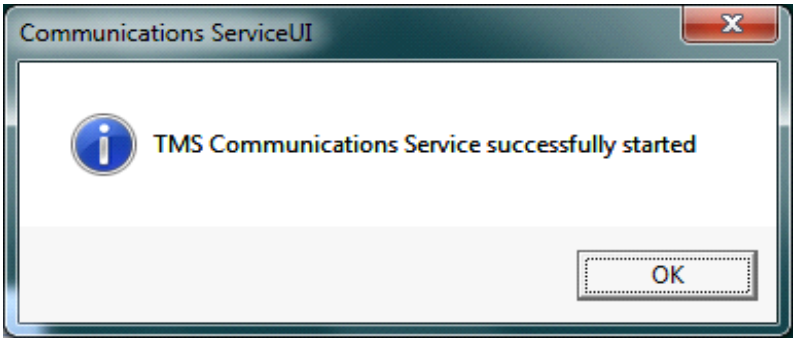

Communications ServiceUI
Could not establish connection to Local Communications Server.
Please check if TMSService is running.
You must open Comms UI with administrator privilege to start TMSService.
Do you want to start TMSService?
Yes
No

Select “Yes” in the above window

If the Communication Service UI is open with Non-Administrative privileges, the following message will appear and the Communication Service will fail to start

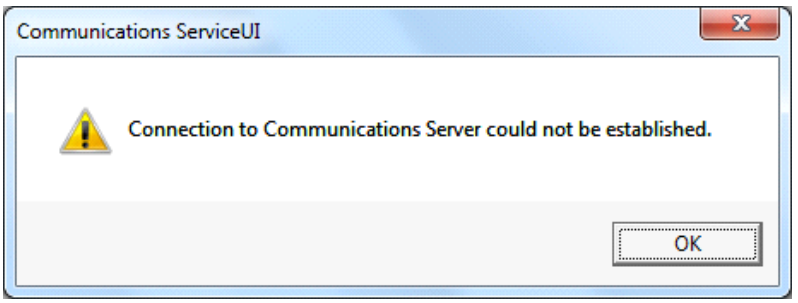


If the Communication Service UI is open with Administrative privileges, the following message will appear and the Communication Service will start. Subsequently, the Communication Service UI will also appear.

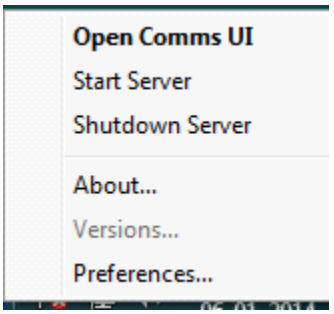


Select “No”, and no further action will be taken.

If the **Trend Server** software is not running when the Communication Service UI is open, performing any activity in Communication Service UI will appear with the following message

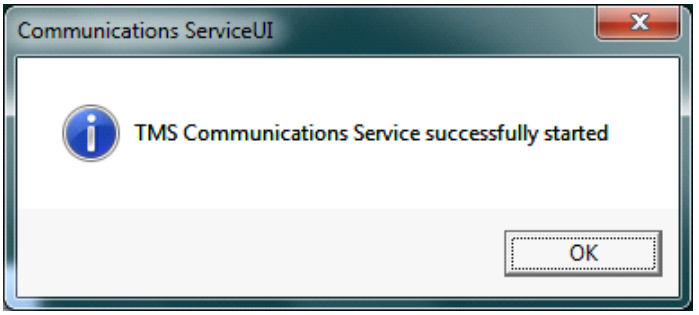


Select Comms Server UI from the menu to start.



If the Communication Service UI is open with Non-Admin privileges, the following message will pop up “Communication Service failed to start”

If the Communication Service UI is open with Administrative privileges, the following message will pop-up and the Communication Service will start



The Communications Server appears as an icon in the Windows™ system bar at the bottom right of the screen. Double click or right click to open, loads automatically with **Trend Server**. The comms server manages the communications status of devices on a serial port (RS485) or through an Ethernet connection. Only Modbus protocol is available for **X Series** and **GR** devices, see *"Appendix G - Modbus Communications and Modbus Profile Tool" on page 293.*

The Modbus protocol can be used to connect with other devices that support floating point values in their register maps.

Devices are held in databases and the databases are accessed via the Database Server. It is possible to connect to remote database servers, and access their databases and devices. Similarly, connections can be made to remote comms servers to retrieve data from their devices.

The comms server uses IP Addresses to locate devices on local and remote servers. All Logging configuration for comms logging and logging to a database is set up from the Comms Server.

The Comms Status shows all the activity of devices, Communications ports, Databases and Database Servers. The window to the left displays the areas controlled by the comms server, the database servers and the communications ports. The display area(s) to the right will display details of any item selected in the left window. Depending on what has been selected the right window will split in two to give logging information. Items listed in the left window that have a + sign against them contain other items, click on the + sign to reveal the list of items contained within. The + sign will change to a - sign when all the items are displayed. To close the list, click on the - sign.

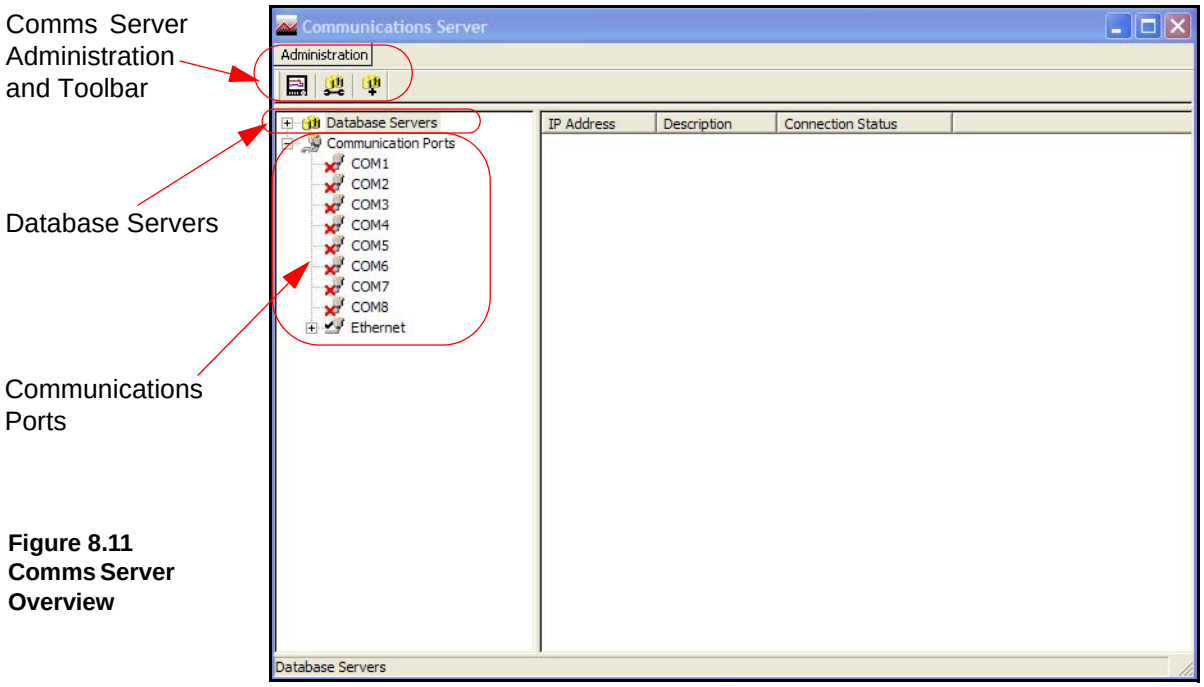


Figure 8.11 Comms Server Overview

Administration

The ***Administration*** button appears in the top left of the comms server, it contains:

- ***Preferences*** - The ***General Settings*** tab has an option to minimise the Server when it is opened. The ***Diagnostics*** option that will produce an additional tab to the bottom window, this will display properties and values of a selected device. ***Send Recorder Events*** is an option that needs to be enabled to allow event data to be exported when the export data function is performed and this will also allow event chart controls to be enabled. The ***Clear Setup Cache*** button will remove all setup files. ***Network Settings*** is for PC's with more than one network card fitted to access devices on other networks. The network cards are displayed here for selection. If the 'Use NIC Default IP Address Selection' is ticked then the first network card that was added to the list will always be selected.***Timing Setups*** tab displays the current timings for the current communications setup. These entries should be configured correctly and not require any changes by the user.
- ***Port Configuration*** - these are the Modbus port settings. The Peer to Peer communications function sets up the recorder so it can be recognised on a network. If lots of recorders are on the same network they can be easily identified and connected to.
  - **Modbus port -** Default port number 502
  - **Peer Services TCP Port** (Transfer Control Protocol) - Default port number 8955
  - **Peer Services UDP Port** (User Datagram Protocol) - Default port number 8956

  The TCP and UDP port numbers have been specially selected for his type of network communications. It is recommended that the TCP and UDP ports are **not** changed unless specifically requested by your IT network administrator.
- ***Contents*** - Enables the Help files.
- ***About Communications Server*** - Gives the version of the software.

Add a new Device to a communications port.

Use this icon button as one way of adding a device to the Communications port. Other ways of adding a device are to right click on the desired port in the left window ie. Ethernet, and select the ***Add Device*** option. Or select a comms port in the left window, right click in a clear space in the top window and select Add Device.

Configure Database Logging

Use this icon button to configure a device for logging channels to a database. Other ways to configure logging are to right click on a comms port or a device in the left window, or a device in the top window displaying the device for that port.

Connect to a new Database Server

Use this icon button to connect to a database server, either a ***Local,*** or ***Remote Server*** that has been added to the database servers list. Connection can be made by selecting 'Database Servers' in the left window and then right clicking in a clear space in the top window displaying the database servers list.

Communication Ports

The ***Communication Ports*** is a list of ports available, ***COM1*** to ***COM8*** and ***Ethernet***. As devices are added they are displayed under the port name. Click on Communication Ports to display a list of all the ports in the main window, tick the required port to enable. Click on a port and the main window splits into two windows, top and bottom.

The top window displays details of the devices using that port including device ***ID No.***, device ***Name***, ***Mode*** and ***Status*** show if the device is connected, how many ***Channels*** the device has enabled, an ***Active*** button to activate the device and the device's ***IP Address***. As devices get added to each port they will display in the list for that particular port.

The default is N-8-1 which means no parity, 8 data bits and 1 stop bit. This is currently the only byte option supported by Comms Server.

Database Servers

The ***Database Server*** will list databases and display the devices within each database as they are added. Click on any of the database servers or the database within and details of that item are displayed in the main window. The main window will split to give additional information for databases showing comms port and device details.

Devices are added to the comms server through the Communications port, the device can then be configured for logging. The devices appear in the database and these databases are held within database servers. *Figure 8.11 on page 186*, shows the comms status screen, in the left window from the top is displayed Database Server, Local and remote database and devices held on the Local database.

Connected databases are displayed with a green icon. If the database is in red it is not connected, check the ***IP Address*** and ***Device ID*** are correct and a protocol has been selected on the device. Un-tick and then tick the active box on the comms server to restart the database connection.

This section looks at the Comms Server's main elements displayed in the Status Screen: Database Servers, Local and Remote Servers, Databases, Communication Ports, Database logging and Client connections

Remote database servers can be added to the list to enable access to devices held in other databases on a remote database server in another location. To connect to a remote database server the IP address must be known of the PC where the databases server is held.

Items with a '+' sign signifies there are items within. Click on the '+' sign to activate/expand.

- Listed under the Database Servers are a list of Servers.
- Listed under each Server are the Databases.
- Listed under each Database are the devices

.

This is the Database Server icon.

This is the Database icon

The bottom window has three actions, ***Client connections***, ***Database logging*** and ***Diagnostics***. When a device is selected from the top window details of the device's activity is displayed here. Device logging to a database will display details in the Database logging tab. Realtime data will display in the Client connections tab. The Diagnostics tab can be activated by going to Administration, Preferences and ticking the Show Diagnostics box, this will display properties and vales of a selected device.

Database Size Management

Although there is no fixed maximum size for a recorder database, we recommend that they be limited to some practical limit, rather than just letting it increase in size unchecked. Large databases will impact the performance of your PC, the larger the database, the slower the performance of your PC will be; eventually the PC would stop as the hard drive is filled up. Another concern should be the protection of your database and archiving of the data in the event of a hard drive failure. Larger databases increase the time and effort required to back up the data and increase the risk of unintended data loss if there is a PC failure and the data is not backed up.

The PC's performance is dependant on the size of the database and the PC characteristics (e.g. Performance, Memory, Hard-drive space) along with how many recorders are connected to it. An initial recommendation would be that if your process involves archiving to removable media (DVD for example) then the Database should be kept to 4GB to ensure that it fits onto a DVD for long term storage. This would provide good PC performance, make archiving of the data easier and limit the risk of data loss between archives. As with any recommendation, you need evaluate this relative to your needs; this is your data and it is important that a suitable process is put in place to ensure that it remains protected and secure while achieving adequate process performance.

Maintenance

It is strongly recommended that data on Trend Server pro machine is backed up on a separate disk or media at regular intervals, to avoid data loss, due to PC crash or hard disk failures.
The data here refers to both data base files and other configuration information stored on disk.

Depending on the OS the following folders needs to be backed up.

Windows XP, Windows Server 2003:

1. Data base backup using DB backup tool
2. TMP and CommsServ folders at "C:\Documents and Settings\AllUsers\ApplicationData\"

Windows Vista, Windows 7, Windows 8, Windows Server 2008 and Windows Server 2012::

1. Data base backup using DB backup tool
2. TMP and CommsServ folders at "C:\ProgramData\"

Note : After the prolonged usage, if Trend server Pro machine becomes slow, the machine should be restarted.

As a best practice this can be done at regular maintenance intervals along with data backup activity."

Comms Server Setup

The comms server software can be run independently of the main application software by creating a shortcut to the Startup folder. If over-writing a previous version of **X & GR Series** Comms server, only the local server will retain the database information and load all the devices and settings from the databases. Any other remote database servers will have to be added manually.

Comms Server - new user

Using the comms server from scratch requires:

1. Add a new device to a Communications port. Devices will appear under the Communications Port, when selected, in the left window and will appear in the initial database on the local comms server. *See "Add a Device" on page 191*
2. Click on 'Communication Ports' in the left window to display a list of the ports in the main window. Tick the port that the device has been added to. *See "Communication Ports" on page 188*
3. For a realtime connection, check device connection status by clicking on the device under its comms port in the left window to display the device status in the top main window. Green LED's will show a realtime connection is made. If grey LED's are showing and the device displays 'Unconnected' and if Red LED's display then there is a problem with connection.
4. The data from this device can now be logged to a database by using the Configure logging screen and setting up channels for logging with the log rate and type and setting up a destination database. *See "Logging Configuration" on page 196*
5. When the realtime data is being run, eg. graphed to the application server software, or an OPC client, this will enable the bottom window that will display details of the data.

Keep power saving options of the PC disabled, if enable it will turn off display and put computer to sleep which will stop real time data logging.

Add a Database

To add a database to a server, right click on the server eg. Local Server, select Add Database and complete the dialog box details for the name and description of the device.

Add a Database Server

1. Use the database icon with a + sign in the top left of the comms server window.
2. Right click on Database Servers in the top left window

Connect to a Database Server

1. Select 'Database Servers' in the left window and then right click on the server to be connected in the servers list in the main window.
2. Connect to database server dialog box will appear, enter an IP address and a description to identify the database server.

Delete a Database Server

1. Right click on the database server to be removed and select the delete option.
2. A dialog box will appear with the IP address of the database server to be deleted. If this is correct, click on OK.

All database servers can be removed except for the Local Server.

Add a Device

There are three ways to add a device, they all deliver the same dialog box:

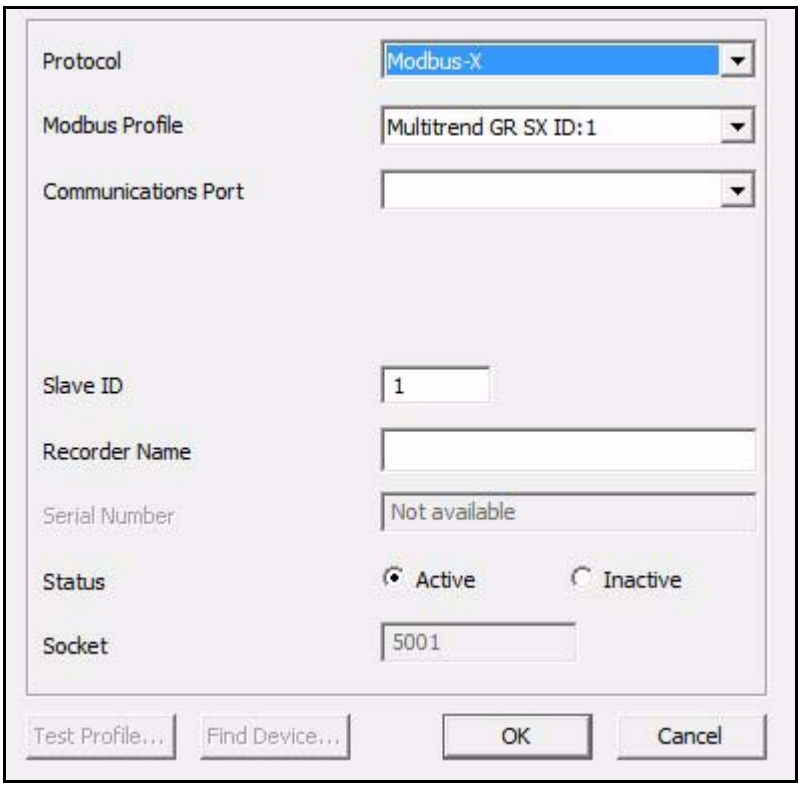
1. Use the device icon in the top left of the comms server window.
2. Right click on a selected Comms port in the left window, COM1 to COM8 or Ethernet and select Add Device from the resulting menu.
3. Select a Comms port and right click in a blank space in the top window and select Add Device from the resulting menu.

Add a Device via Ethernet.

Now the recorder must be added. To do this click the “add new device” button, The first in the row of three. This will bring up the Device Details box.

All these methods will produce the Add Device Details box. Areas of the box become greyed out as the selections are made.

For **X Series** and **GR** devices the process of adding a device has been made very simple. Use the Find Device button at the bottom of the dialog to see a list of available devices. When you add a device using this method it will automatically populate the dialog with the recorder details. *See “Find Device” on page 193*.



Protocol - For active Modbus devices, the recorder name and protocol variant can be changed (Modbus vs Modbus X). For an inactive Modbus device the device profile can also be changed.

Modbus Profile - The Profile name box is used to tell **Trend Server** how to access the data on the recorder. This profile is automatically generated from the recorder setup that was downloaded to **Trend Server** previously.
The system creates Modbus profiles from an imported setup or logged data and creates a profile including information for pen, scale, units etc. The profile Name is made up from the Recorder name, Type and ID number. Once the setup or data has been imported it will display in this window the next time that it is opened, no need to restart Comms Server.
For **X & GR-Series** recorders drop down the list and select the recorder from the list. It will be in the list under the same name as the setup previously saved.
If any equipment, other than **X & GR-Series** recorders is to use **Trend Server** to log and graph data then a profile has to be generated. A Modbus Profile Tool is now available to aid in setting up Device Profiles for other devices. The Comms Server can support up to 96 pens per device.

NOTE: The Recorder ID number is NOT the same as the Slave ID Number

A Modbus Profile Tool is now available to aid in setting up Device Profiles for otherdevices, refer to *"Appendix G - Modbus Communications and Modbus Profile Tool" on page 293.*

Communications Port - Choose between Ethernet or RS485 for COM ports 1 to 8. This may already be entered depending on how you have chosen to add the device. The RS485 Comms option card and expansion card are required for the **QXe** recorder.

Slave ID - This is a unique Modbus ID/Address used by the recorder to identify Modbus messages. Applications that talk to the recorder with Modbus will need to know this number to return messages to the device. The same number must match in Comms Server.

Recorder Name - This is the name displayed in the top right any process screen on the recorder.

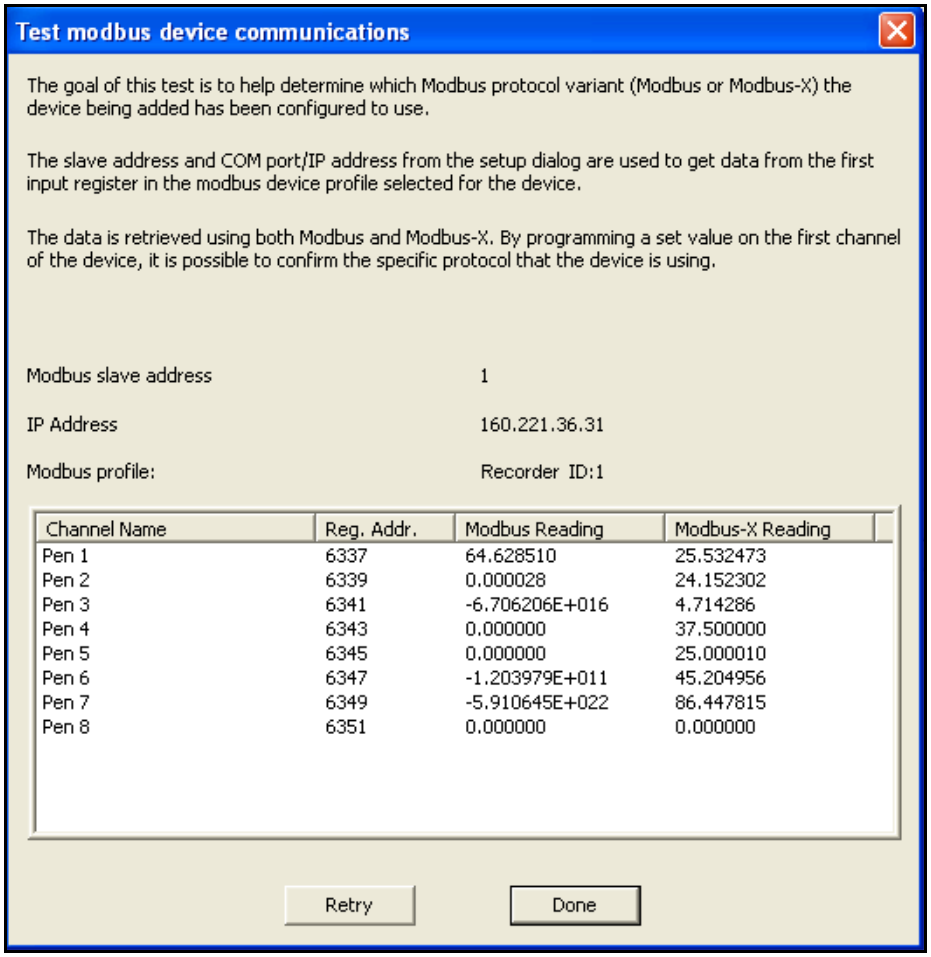
Status - This will automatically enable the designated port and the device will become active. This can be activated later from the main Comms Server screen.

Socket - This number should not need to be changed, only by advanced users for networking.

The **Test** button enables the "Add Device" settings to be validated. It can be used to determine whether the recorder is configured for Modbus or Modbus X. Because we are using Modbus-X, the Modbus-X column gives correct readings; the Modbus column returns wrong readings. (Vice-versa if using Modbus)

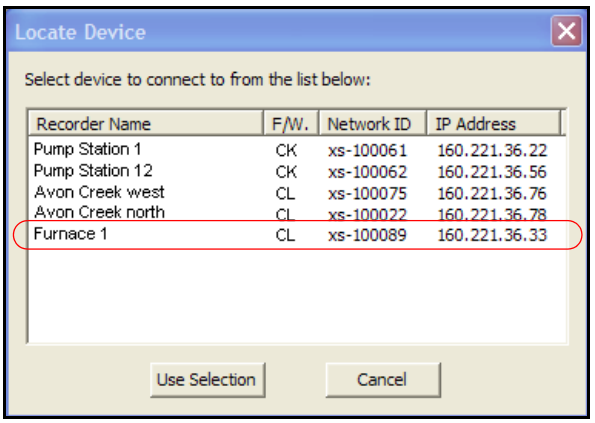
If the column shows the correct reading the recorder must be communicating correctly.

Press "Done"


Test modbus device communications
The goal of this test is to help determine which Modbus protocol variant (Modbus or Modbus-X) the device being added has been configured to use.
The slave address and COM port/IP address from the setup dialog are used to get data from the first input register in the modbus device profile selected for the device.
The data is retrieved using both Modbus and Modbus-X. By programming a set value on the first channel of the device, it is possible to confirm the specific protocol that the device is using.
Modbus slave address 1
IP Address 160.221.36.31
Modbus profile: Recorder ID:1
Channel Name | Reg. Addr. | Modbus Reading | Modbus-X Reading
Pen 1 | 6337 | 64.628510 | 25.532473
Pen 2 | 6339 | 0.000028 | 24.152302
Pen 3 | 6341 | -6.706206E+016 | 4.714286
Pen 4 | 6343 | 0.000000 | 37.500000
Pen 5 | 6345 | 0.000000 | 25.000010
Pen 6 | 6347 | -1.203979E+011 | 45.204956
Pen 7 | 6349 | -5.910645E+022 | 86.447815
Pen 8 | 6351 | 0.000000 | 0.000000
Retry
Done

Find Device

This can be used to find **X Series** and **GR** recorders on the network. It uses the recorder's unique Network ID to identify them and populate this list. Select your device from the list and press the Use Selection button to insert the recorder details into the Add Device box.


Locate Device
Select device to connect to from the list below:
Recorder Name | F/W. | Network ID | IP Address
Pump Station 1 | CK | xs-100061 | 160.221.36.22
Pump Station 12 | CK | xs-100062 | 160.221.36.56
Avon Creek west | CL | xs-100075 | 160.221.36.76
Avon Creek north | CL | xs-100022 | 160.221.36.78
Furnace 1 | CL | xs-100089 | 160.221.36.33
Use Selection
Cancel

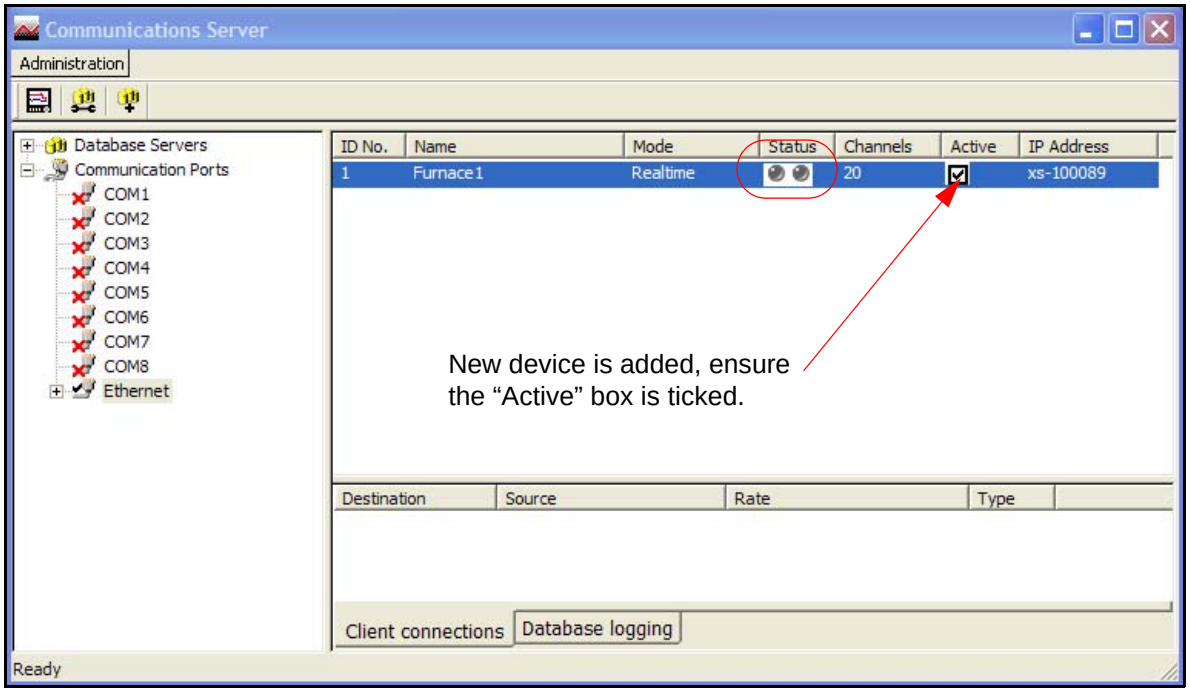
When you get back to the Add Device Detail Box, press "OK".

The recorder you have set up will now be added to the device list.

Add a Device via RS485

Setting up the Comms Server for Modbus on RS-485 follows the same procedure, but the PCs comm port that the 485 interface is connected to is selected in the “Communications Port” drop down list. Everything else is the same (there is no IP address to enter) and test should still work the same.

Figure 8.6 New Device Status



The status lights will not be active yet. This is because no logging or graphs have been set up so no data is being requested.

To set up Logging go to *“Logging Configuration” on page 196*

To start Realtime graphing go to

Edit a Device

Select the Comms port containing the device for editing and right click on the device either in the left or top window. The Edit Device Details dialog box will appear showing the configuration for comms with that device. Any fields not greyed-out can be changed. For Ethernet devices the IP address can be changed. Any device can be made active or inactive from here. For active Modbus devices, the recorder name and protocol variant can be changed (modbus vs Modbus X). For an inactive Modbus device the device profile can also be changed.

For information on the **Test** button, see above.

Click on the OK button and the changes are saved.

Delete a Device

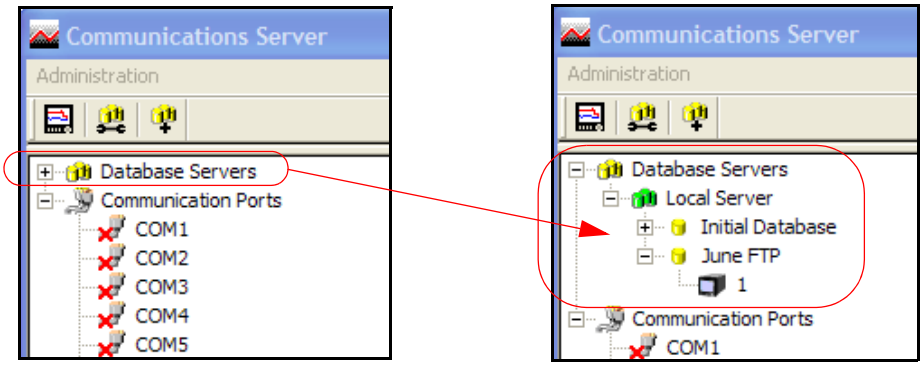
Select the Comms port containing the device to be deleted and right click on the device either in the left or top window. Select Delete Device from the resulting menu. The Delete Device Details dialog box will appear showing the details of that particular device. Check this is the correct device for deletion, then click on the OK button and the device is removed, otherwise the operation can be cancelled.

Comms Server Logging

To set up logging you must first decide where to store the data. A database must be set up. The database can either be on the PC running Comms Server, or on another networked device.

There will be a database already set up by default on your PC when **Trend Server** was loaded. This will be called “Initial database”.

To set up a database on the PC click the “Database Servers” icon, this will expand to show “local Servers” i.e. databases on that PC. Click “local servers” to expand out to show all databases.



In the example shown there are two available databases. The default database called “Initial Database” and another called “June FTP”.

Databases can be added by right clicking on the “Local Server” icon and then clicking “Add Database”. Enter a database name and description, click OK and the new database will appear on the list.

To add a database server you will need the IP address of the device that will be the database server. Click the “new database server” button.

Enter the IP address and a new database server will be added. Add databases to this server as above.

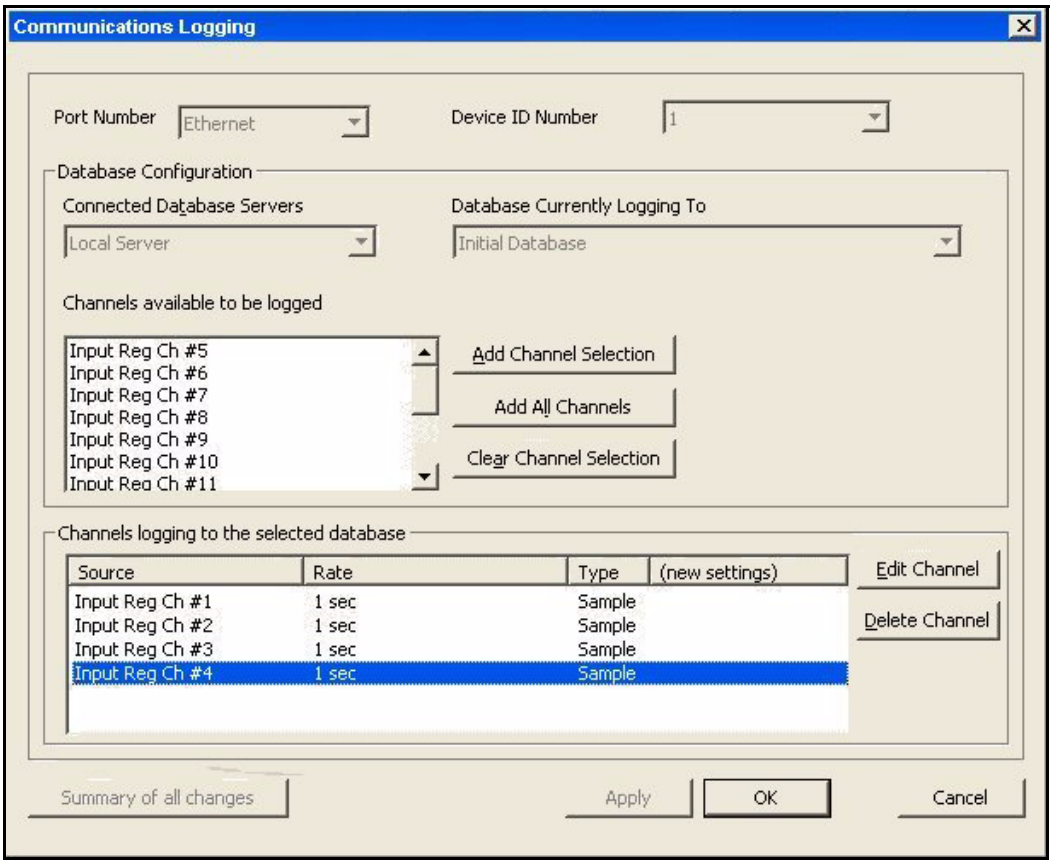
Logging Configuration

This screen configures channels for logging from a device to a database. It can be accessed in several ways.

1. Use the Configure Database Logging icon at the top left of the screen and select Configure Logging from the resulting menu.
2. Right click on ‘Communication Ports’ in the left window and select Configure Logging from the resulting menu.
3. Right click on the comms port and select Configure Logging from the resulting menu.
4. Right click on the device and select Configure Logging from the resulting menu.

Any of these will display the Logging Configuration box. If this screen is selected from either a comms port or a device then the comms port information will already be inserted. If the screen is selected from the icon or Communications Port heading then the comms port will need to be assigned. Select the device ID number (if necessary), from the drop down menu.

The next section is Database Configuration, a list of connected database servers and a list of databases that are currently being logged to. In this section is a window showing the channels available to be logged. As channels are selected from this window, three additional buttons become active: ‘Add Channel selection’, select each channel for logging, ‘Add all Channels’ for logging and Clear Channel selection.



Add Channels for Logging

As each channel is selected, or all channels depending on the button selected, the Logging Channel Configuration box appears so the Log Rate and Type of logging can be set for each channel individually or all channels.

When the channels have been selected they will appear in the bottom window, click on Apply to enable the channels to log. Once the channels are in the 'Channels logging to selected database' window they can be selected and the Edit and Delete button become active. The Edit button allows the logging rate or type of logging to be changed.

There is also a Database Events Logging box that can be ticked that allows any events to be logged to the database using Trendbus. (Not available for **X Series** recorders).

Summary of Logging Changes - If any changes are made using the Edit button, the Summary of Changes button becomes active, this will show the last changes made to any of the channels for this configuration only.

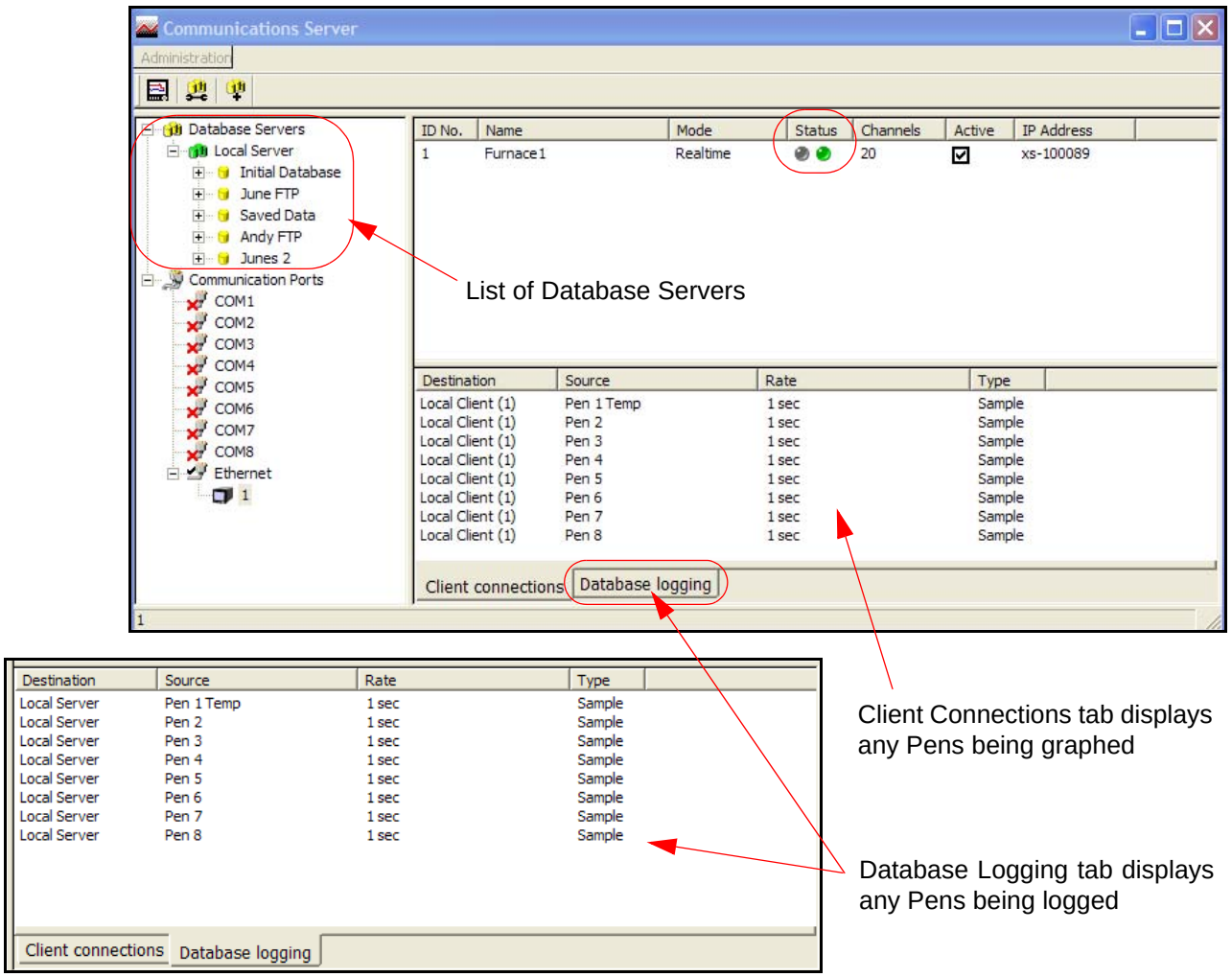
The Delete button will take the channel out of this window and put it into the window showing available channels for logging, logging will stop for this channel.

Comms Server Status Screen

If you have a graph open Comms Server should be showing that the recorder is operating by displaying flashing green lights in the “Active column”. Click and highlight the recorder. Click the “Database logging” Tab. The screen should now show all the pens logging for that recorder and their log rate

.

Figure 8.1 Comms Server Status Screen



Comms Server can be minimised now, it will continue to run in the background.

Client Connections

Realtime comms data from the device will only display on the comms server communications status screen when realtime data is active on either the server software or by using an OPC client. Once data is active on a client connection, this window will display details of the device selected in the top window: its Destination or where the information is going to, Source or origin of the data (channel or event), Rate and Type of data sampling being communicated.

Keep power saving options of the PC disabled, if enable it will turn off display and put computer to sleep which will stop real time data logging.

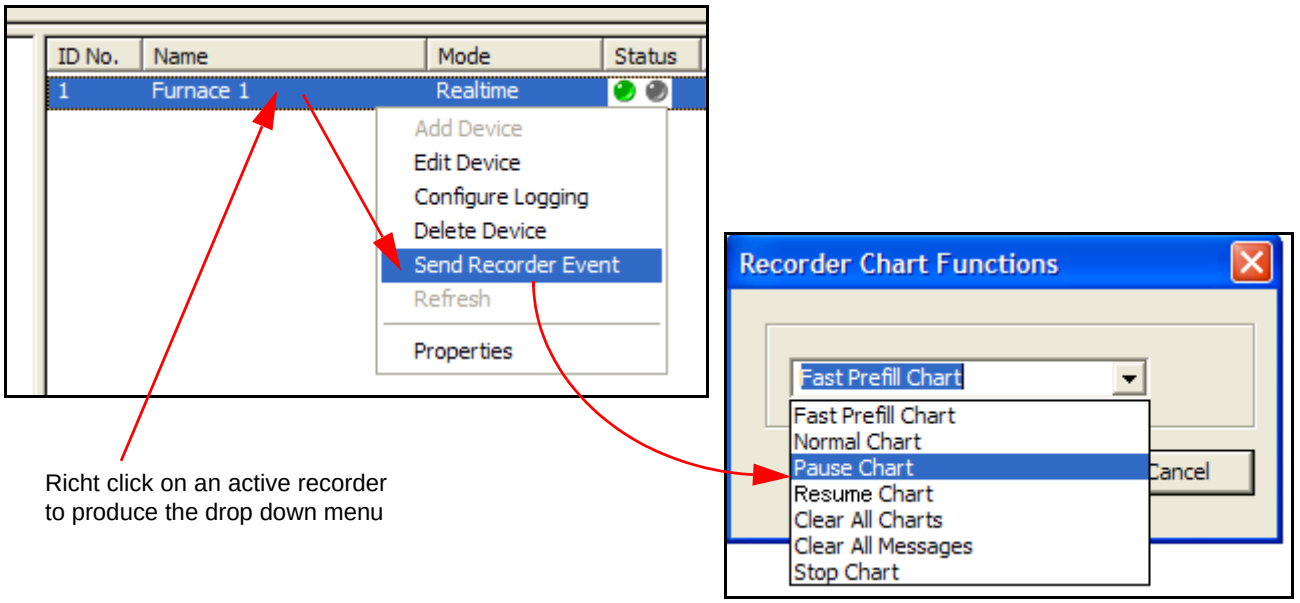
Database Logging

This tab will display information on what is currently being logged to a database for the device that is selected in the top window: its Destination or where the information is going to, Source or origin of the data (channel or event), Rate and Type of data sampling being communicated.

A third tab, ***Diagnostics,*** can be enabled using the Administration button, and selecting Preferences.

Send Recorder Events

Comms Server has a set of chart controls that can control the chart on the recorder from your PC. This can be done in *"Realtime chart controls" on page 199* or can be setup as an Effect of an Event, see*"Event chart controls" on page 199*.



Richt click on an active recorder to produce the drop down menu

Realtime chart controls

Right click on an active recorder in Comms Server, Ethernet or RS485, either from the recorders listed in the left hand window or from recorders in the main window.

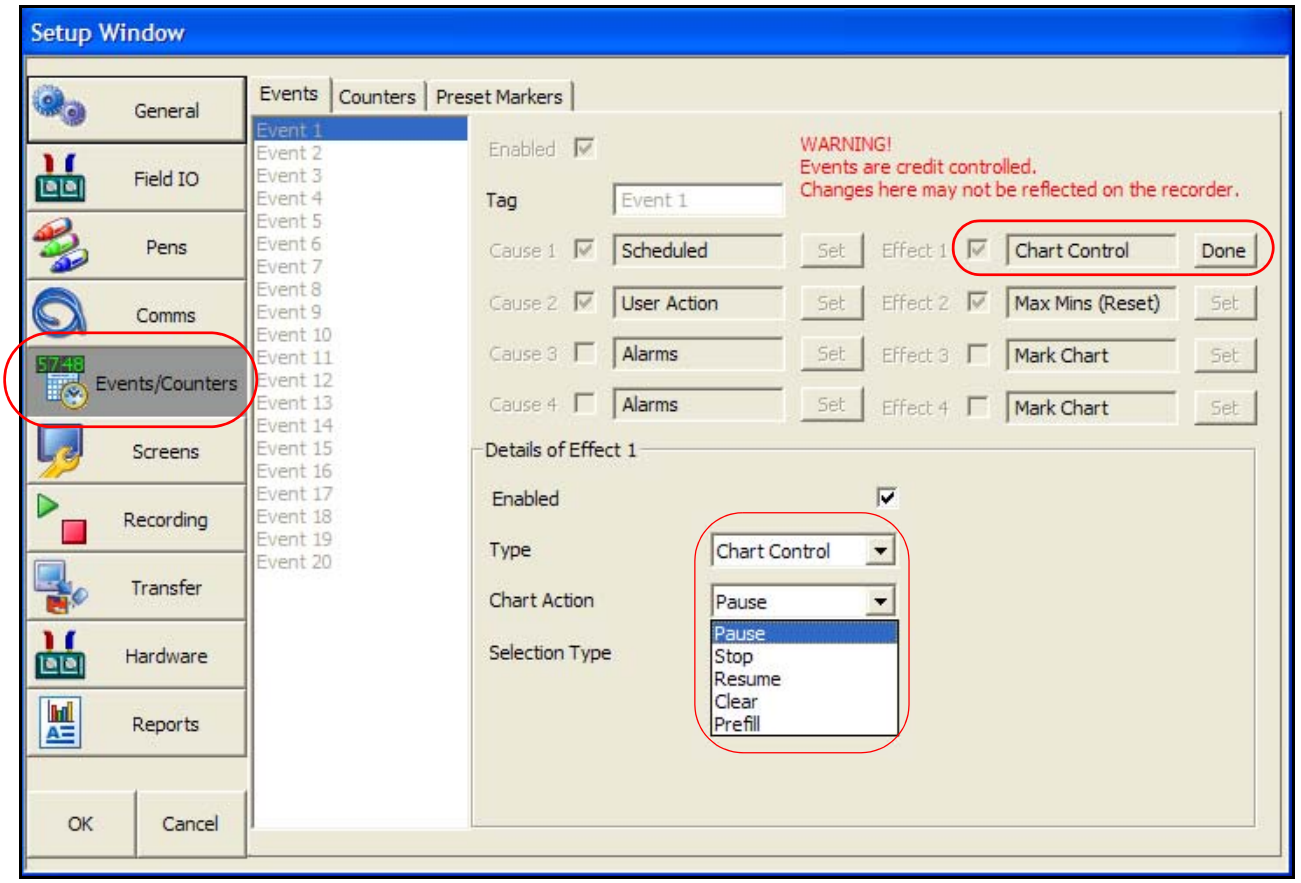
- From the list select Send Recorder Events and the Recorder Chart Functions box will appear. If the option is not in the list go to Preferences in *"Administration" on page 187.*
- Select a chart control function for immediate effect on the recorder. Because **Trend Server** is graphing the data that is being transferred in realtime the recorders running on **Trend Server** will not be affected.

Event chart controls

The same set of chart controls can be activated using the event system in **Trend Server** . Chart controls can be used as an effect of an event happening. In the Events tab in **Trend Server** set up a cause to trigger the effect of a chart control.

- • ***Pause*** *- this will pause the chart until it is resumed. Resuming a paused chart will display continuous chart data from when it had been paused. The chart can be stopped if in a paused state.*

- **Stop** - *this will stop the chart and no chart data will be displayed for the length of time the chart is stopped. If a stopped chart is resumed there will be a gap in the displayed chart data.*
- **Resume** - *this can be used after the chart has been stopped or paused. The chart data will continue from where it has been paused with no gaps displayed. But if the chart has been stopped the displayed data will display a gap in data until it is resumed*
- **Clear -** *this will clear all the data being displayed. Data will not be cleared if the chart has been stopped*
- **Prefill** - *this will clear the chart and then fill it with the current reading.*



Comms Server Database

On system start up the Communications Service will start automatically . This service is responsible for launching database related components.

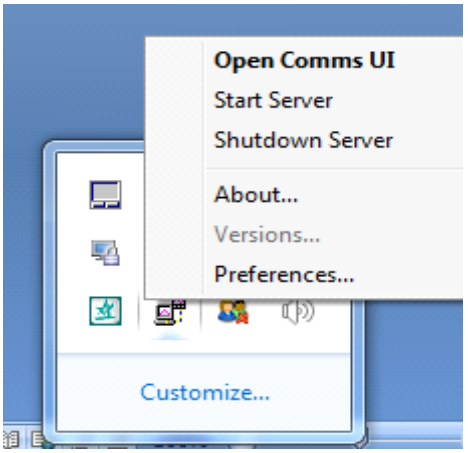
System Setup

The system can be set up two ways.

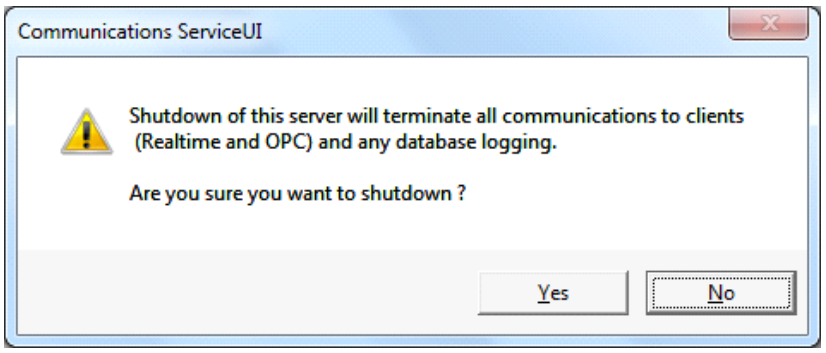
1. For customers who are setting up in preparation for the arrival of their devices. Using the **Trend Server** and Comms Server software, create a database for the device(s) and configure each device for logging using the comms server. When the devices are in place and connected check the IP address (for Ethernet devices only) and the device ID is correct.
2. For larger networks - Set up the hardware first noting each devices ID and IP address. Use the comms server software to set up the devices on a database and configure logging for each device. The devices will need to be set up on the **Trend Server** software before the connections can be tested and become active.

Shutdown Server

The Communications Server appears as an icon in the Windows system bar at the bottom right of the screen. Right click on that icon and you will see the pop up below**.**

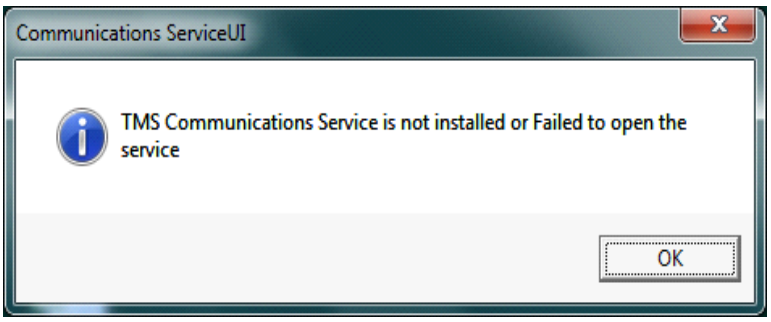


Select Shutdown Server and the following message box would pop up

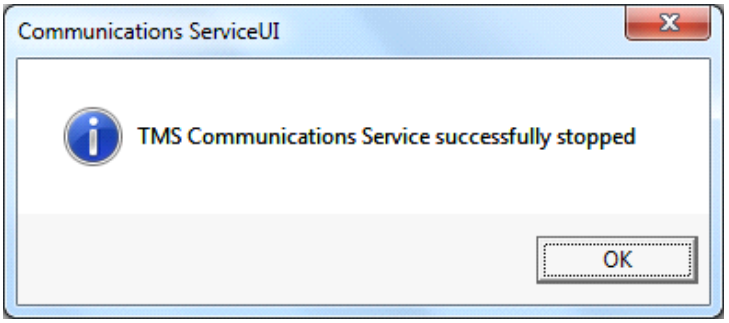

Communications ServiceUI
Shutdown of this server will terminate all communications to clients (Realtime and OPC) and any database logging.
Are you sure you want to shutdown ?
Yes
No

Select “Yes” and the following events will happen

If the Communication Service UI is open with Non-Admin privileges, the following message will appear. Select “OK” and the Communication Service UI will be closed but the **Trend Server** software will still be running:



If the Communication Service UI is open with Administrative privileges, the following message will appear. Select “OK” and the Communication Service UI will be closed and **Trend Server** software is also successfully stopped.



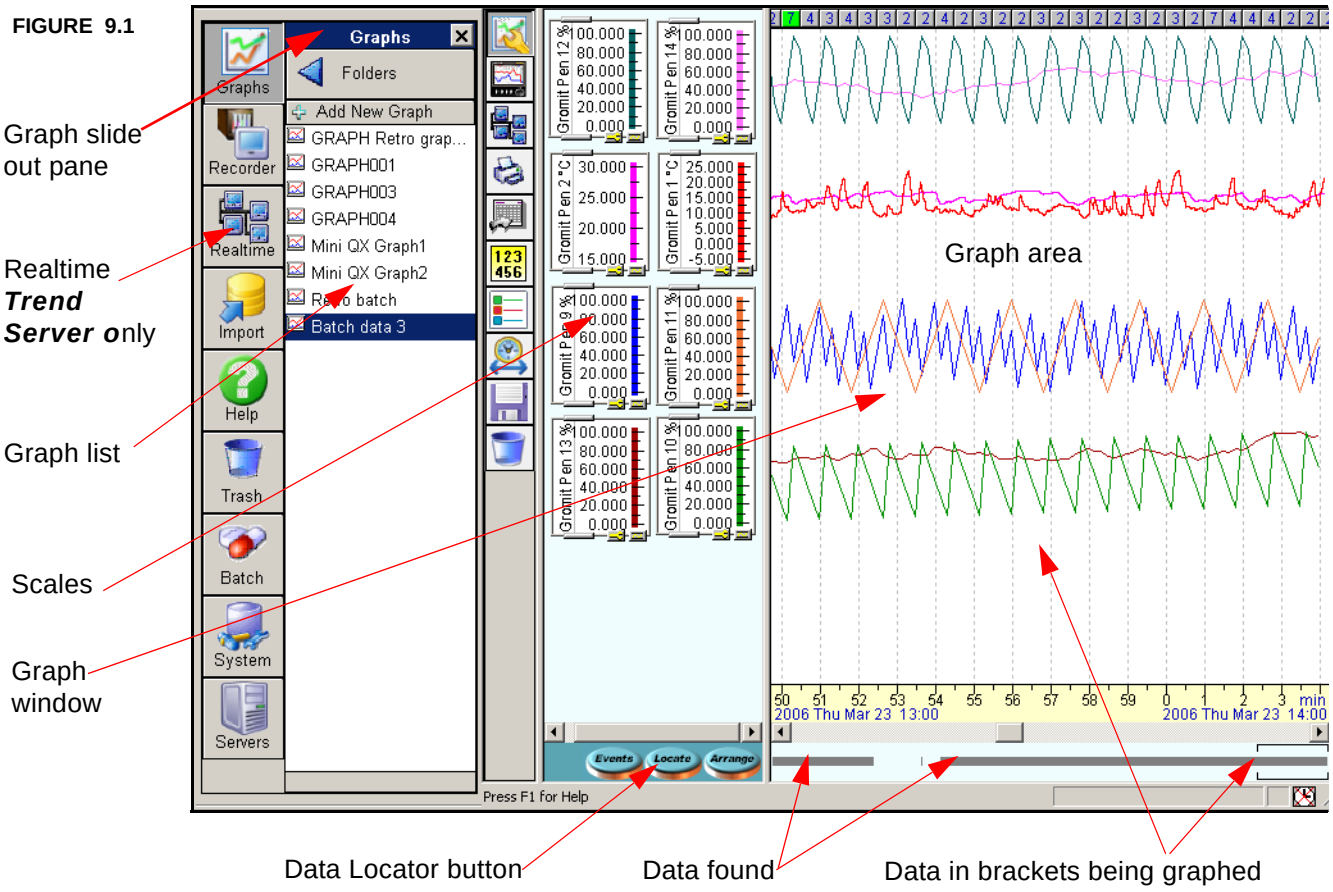
Select “No” and no actions will be taken.

Chapter 9: Graphing in the Trend Analysis Software

Graphing

The ***Trend Analysis Software*** allows the user to prepare data imported from the recorders as a graph. All the areas listed below are covered in the ***Trend Analysis Software* Help.** Click in any area on the screen and press F1 on the keyboard to display the related help files.

FIGURE 9.1



Graph list

This is a list of the stored and open graphs in the currently selected folder. *See "Folders" on page 154*

Add New Graph

- To open a graph click on the ***Graph*** icon at the top of the ***Button bar***. This displays the ***Graph slide-out pane***.
- Click on ***Add New Graph*** and a blank graph will appear.

Graph a recorder

- To graph a device go to the recorders list under the ***Recorder slide-out pane.***
- Drag and drop the desired device either over a blank section of backdrop (to make a new graph) or over an existing graph to add traces to it. Data can be imported without first closing graphs, relevant graphs will auto update.

Traces on graphs

- To add traces to a new or existing graph, select the recorder icon on the graphs tool bar called “Add Data to Graph” and click on ***Pens*** to reveal the ***Pen list,*** see *Figure 9.3 on page 206.* Drag and drop the selected pen(s) to the scale or trace areas of the graph.
- Traces can be deleted easily by dragging and dropping the pen scale over a ***Trash can***. This does not delete any data, only removes the trace from the graph.
- Traces can also be added by double clicking on them.

Copy a graph

- Go to the ***Graphs list*** under the ***Graphs slide-out pane.***
- Either drag the selected graph onto a blank section of the ***Graphs list*** or right click and select copy. For moving graphs between folders, see *“Move a graph between folders” on page 154*

Graph with Events

See “Graphing Events” on page 213

Graph a Batch

See “Graphing a Batch” on page 216

Save a Graph

- When the graph is closed a prompt will appear to save the graph. Enter a name for identification and click on Yes and the graph will be saved and appear in the Graphs List.
- The graph can be saved directly by clicking on the Save icon on the left side of the graph area or from the Graph Menu, by clicking on the Save. Ctrl + S also will save a graph.
- The graph is saved exactly as it is displayed at the time of closure.
- Just the graph is saved not the data.

Save As a Graph

- Save As feature allows the graph to be saved with a different name.

Rename a graph

Graphs can only be renamed when none are open or the first time it is saved.

- Go to ***Graphs list*** under the ***Graphs slide-out pane.***
- right click on the graph icon and select rename.
- enter the new name in the box provided and click on OK.

Delete a graph

- Go to the ***Graphs list*** under the ***Graphs slide-out pane.*** Either drag the desired graph icon over the nearest ***Trash can*** or right click on it and select delete.

Data Locator

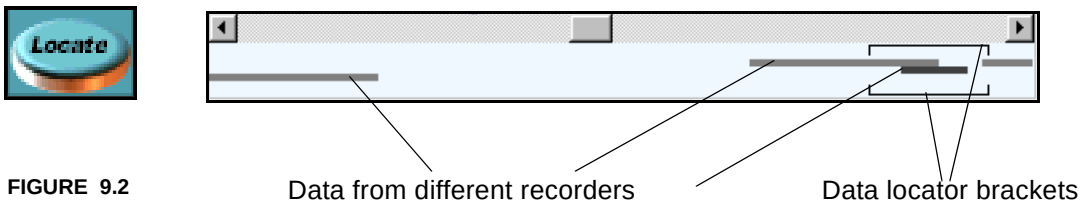


FIGURE 9.2

Use the ***Data locator*** to find your data. The ***Locate*** button appears at the bottom of the scale window, activate this to reveal an area below the ***Time bar*** underneath the ***Graph window***.

The ***Data locator*** displays the location of data as grey bars, each bar representing data from a single recorder. The Data Locator shows all the data from a recorder(s), as a bar. The locator brackets represent the visible span of your graph.

Data can be found by moving the ***Data locator brackets*** along the X-axis until they capture the grey bars. Many recorders can be displayed on one graph. Drag the recorders from the Database slide-out pane onto the graph.

Using the left mouse button, click, hold and drag the data locator brackets left or right over the data. Right click to cancel a selection. The brackets can be resized to encompass small or large amounts of data. This data will then be displayed on the graph. Zoom in or out by left or right clicking on the time bar.

When the cursor is placed over the ***Data locator brackets***, two arrows will appear. Use the right mouse button to move ***Data locator brackets,*** notice the brackets do not resize as with the left mouse button but remain the same.

The year, day, month and time will be displayed whilst the locator is being moved. For recorder specific help, select any item on the screen for enquiry and press F1 on the keyboard.

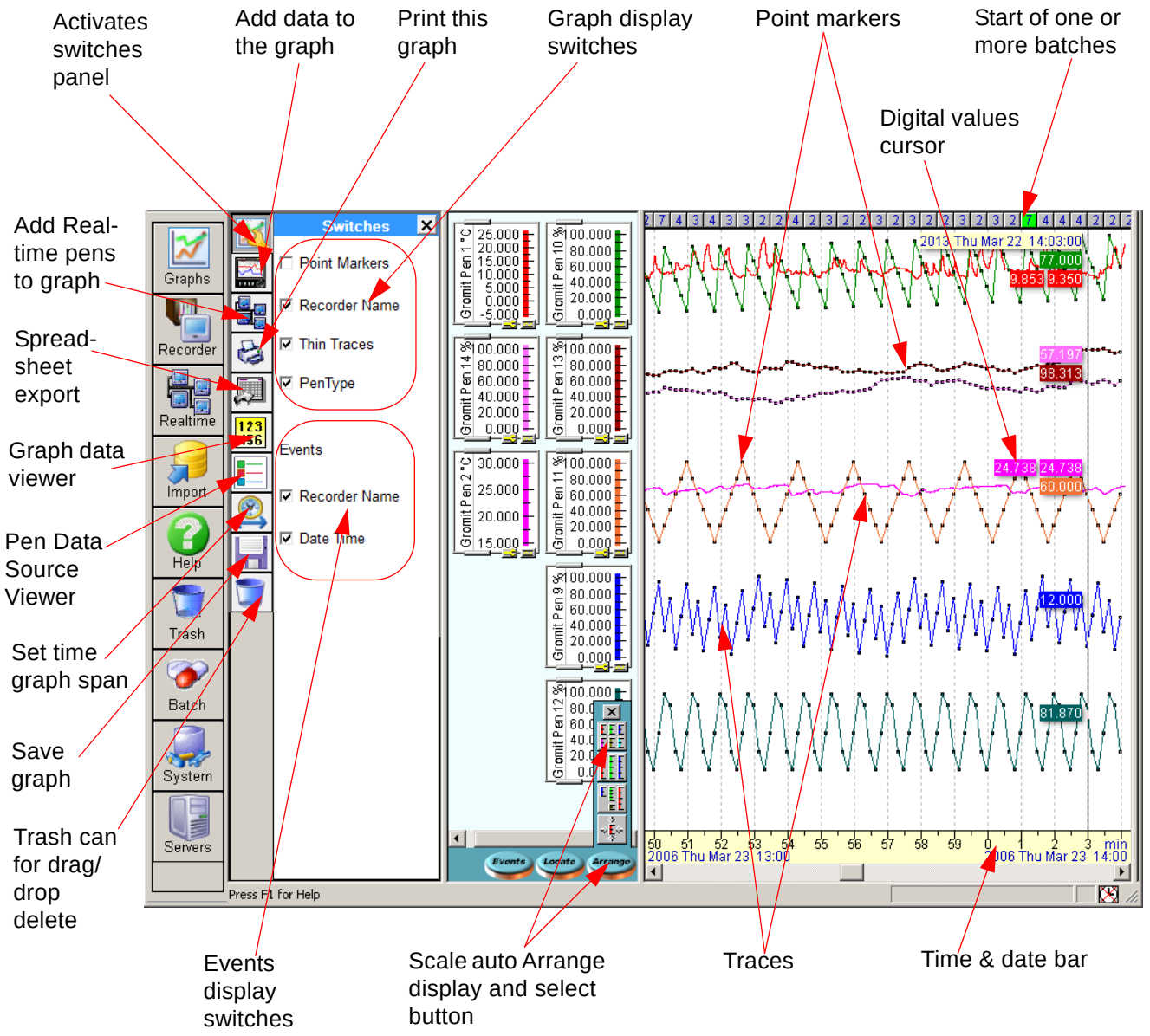
Adding historical data to a realtime graph

Historical data from a recorder on a database in the comms server can be added to a graph already displaying realtime data. The realtime data is graphed in the blue tint section of the graph area. Drag a recorder or pens from a recorder, on a database in the comms server, on to the white middle section of the graph area.

For specific help, click on any part of the graph and press the F1 key on your keyboard to display the related help files.

Graph display features

FIGURE 9.3



For specific help, click on any part of the graph and press the F1 key on your keyboard to display the related help files.

"Pen type" option is added to switches panel. Check and UnCheck of PenType will show the pen type legend on the scale or not show the pen type legend on the scale.

Graphing different types of scale data

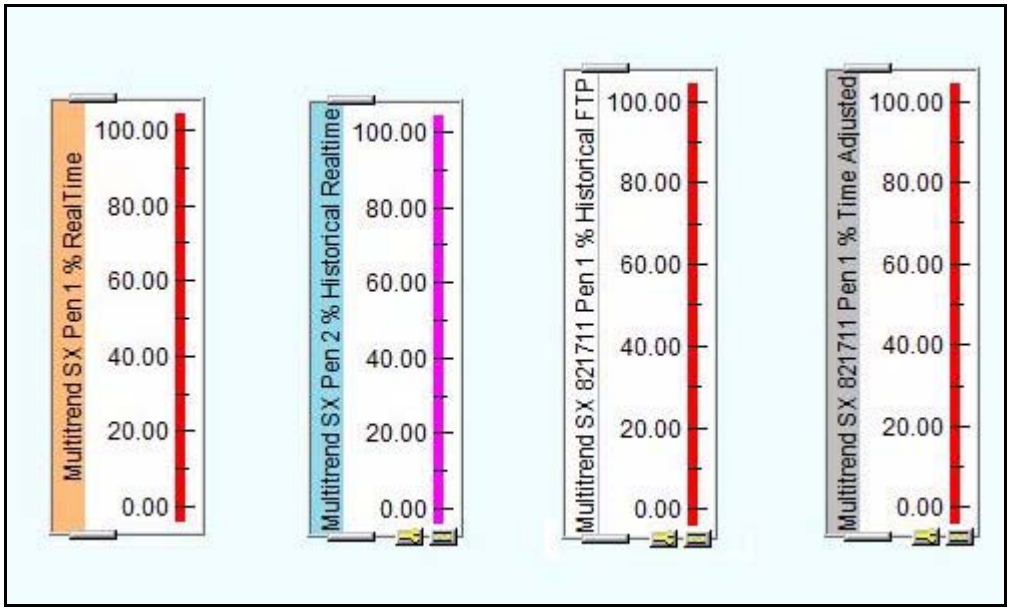


FIGURE 9.4 Realtime data, Historical data, Logged data scales and Time adjustment pen

Realtime data is displayed as a scale with an orange strip down the left side of the scale, realtime data comes directly over the comms connection via the comms server. Realtime data scales will show a legend on pen scale i.e. "RealTime" .

Historic data scales are sky blue, this is data that has been received via comms and stored in a database. Historic data scales will show a legend on pen scale i.e. "Historical Realtime".

Logged data or data from disk will have a completely white scale, this is data that has been transferred or imported from a disk or via FTP. Logged data scales will show a legend on pen scale i.e. "Historical Ftp".

Time adjustment pen scales have a grey strip down the left side, this is data from pens that have had a time adjustment due to day light saving time.

Realtime data and ***Historic*** data should be transferred via the comms server. The historic data is stored in a data base and both sets of data can be displayed at the same time. First, make sure the comms server is active. *See "Graphing Realtime Data" on page 222*

Time adjustment pen

There may be occasions when it is required to adjust the time on the recorder, such as day light saving time. When this occurs and there is an overlap of data, this is recorded on a duplicate pen scale panel hiding behind the original. These can be identified by a grey strip down the left hand side of the scale panel and will show a legend on pen scale i.e."Time Adjustment".see *"Pen Scales" on page 210*. This is viewed best in ***Tile*** or ***Strip*** mode where the ***Trace*** is shown continuous. The time adjustment pen only shows the data that has overlapped, the trace will continue on the original pen.

Pre-Trigger Data

Data imported that includes Pre-Trigger pens will be displayed as overlapped data. Multiple pre-trigger sessions will be shown as multiple overlaps on the same screen, but connected to the same overlapped pen.

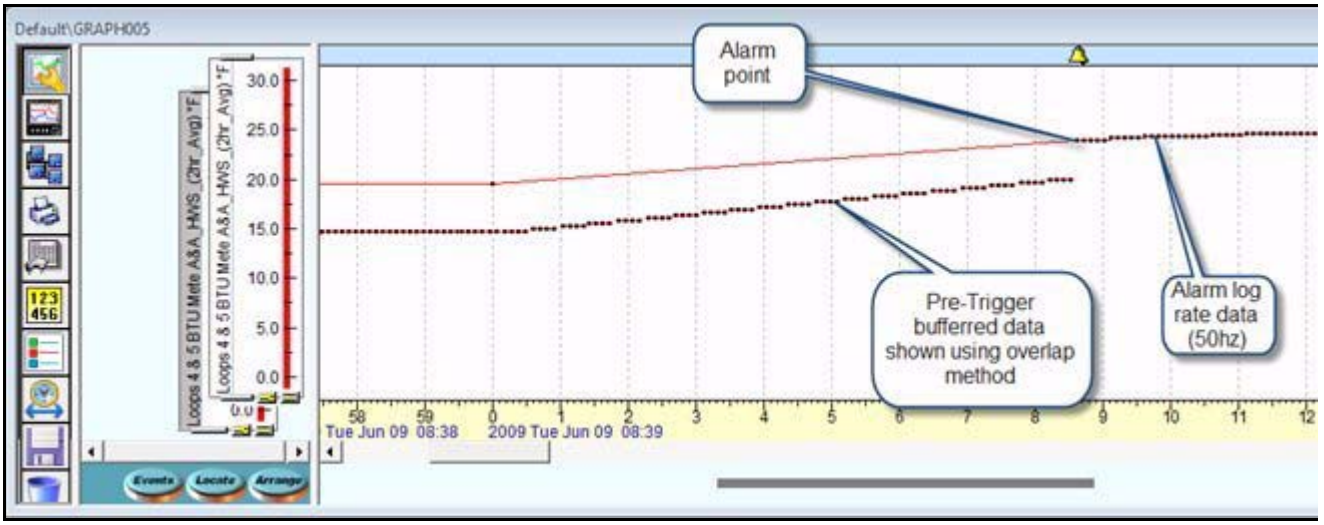
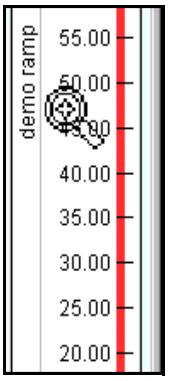


FIGURE 9.5 Pre-Trigger data shown as Overlapped Pens

Zooming



Y-axis zooming

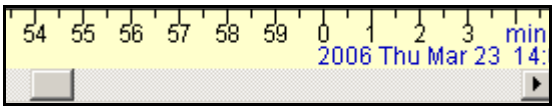
Y-axis zooming is done in the ***Scale window***. Y-axis zooming can be achieved by placing the cursor, which turns into a magnifying glass, over the numbered area of the ***Scale window*** and left clicking to zoom in (increase size) or right click to zoom out (decrease size). To select a specific area of data stay on the numbered part of the scale, left click, hold and drag. Two horizontal lines will appear to enable the user to select a portion of the graphed data. As you click on the ***Scale window*** a boxed area appears on the coloured part of the bargraph showing where the data is that you are scaling.
Having zoomed in, full span can be restored by clicking on the restore button at the top right of the scale. If a large arrow appears in the scale, there is no data available for the trace in the current time span window.

X-axis zooming

Take the cursor to the bottom of the graph into the ***Time bar*** area for X-axis zooming. The cursor becomes a magnifying glass so a left click will zoom in (increase size) or right click will zoom out (decrease size). Another way of 'zooming in' is to select a section of the scale by placing the cursor on the ***Time bar***, using the left mouse key, holding and dragging to the left or right over the desired area. Two vertical lines will appear to enable the user to select a portion of the graphed data. Right click to cancel a zoom on the time bar.

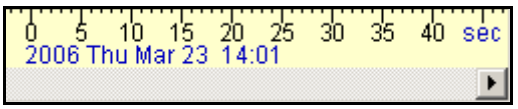
For specific help, click on any part of the graph and press the F1 key on your keyboard to display the related help files.

The ***Time bars*** below show zooming in, increasing the scale in the X-axis.

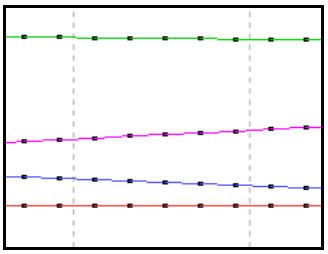


From this,
reading in minutes

to this,
reading in seconds



Point markers

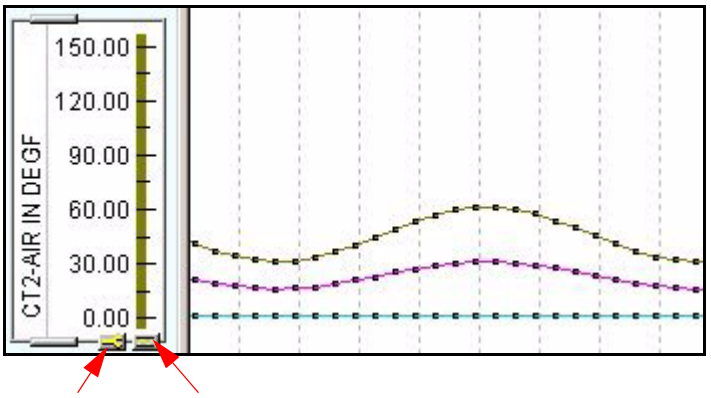


Point markers show the actual logged data points along the trace and are dependent on the logging rate set e.g. if the logging rate is set to one per second then the point markers on the graph will log data every second. Point markers can be added to a graph by going to the ***Switches panel.*** *Figure 9.3 on page 206.*

Pen Scales

The pen scales can show the full scale, as originally set eg. 0 to 150, or can auto-fit the data so far to show the highest and lowest values. So within the 0 to 150 scale the signal may have only measured between 30 and 60 on the scale. Click on the Auto-fit resize button to toggle the scale

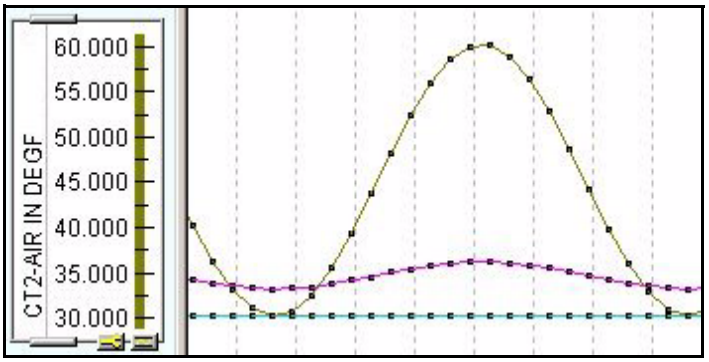
Full Pen Scale



Scale configuration button

Auto-fit scale button

Auto-fit Scale



The scale also has a Scale configuration button, click on this and the change pen scale limits box will appear. In this box is displayed:

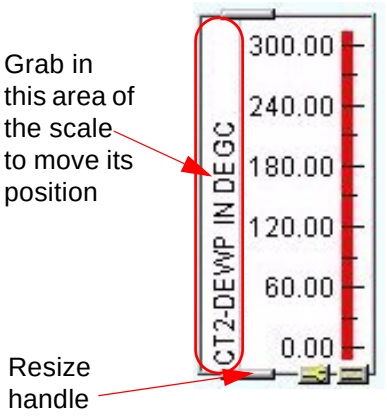
- Minimum and Maximum readings so far for this pen
- Original span and zero scale limits
- Current span and zero scale limits

Set the scale limits using the Max Min, Original or Current buttons, or enter new span and zero scale limits in the boxes provided. Click on OK when finished.

Arranging Scales

Scales can be moved manually or by using the Arrange button.

FIGURE 9.6

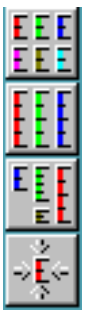


Scale panels can be arranged by placing the cursor over the left hand side of each scale panel until a hand appears. Holding down the left mouse button and drag the scale panel into the desired position then release the mouse button. Remember the position of each scale panel determines the position, within the graph window, of its corresponding pen data. Scale units will also be displayed where applicable.

If a scale appears like a big arrow pointing to the left saying “No more data”, this means that there is no data to display for this pen at this time.

Auto Arrange scales

Along the bottom of the scale window is an ***Arrange button.*** This gives four options for auto arranging the scale panels.



1.The top button automatically generates ***Tile*** mode, as shown.

2.*Strip* mode is the second button which makes all the scale panels full height.

3.The third arranges the scale panels of different sizes to ***Best fit***

4.*Minimise* the scale panels is the bottom button, to achieve the least amount of room taken up.

Resizing scale panels

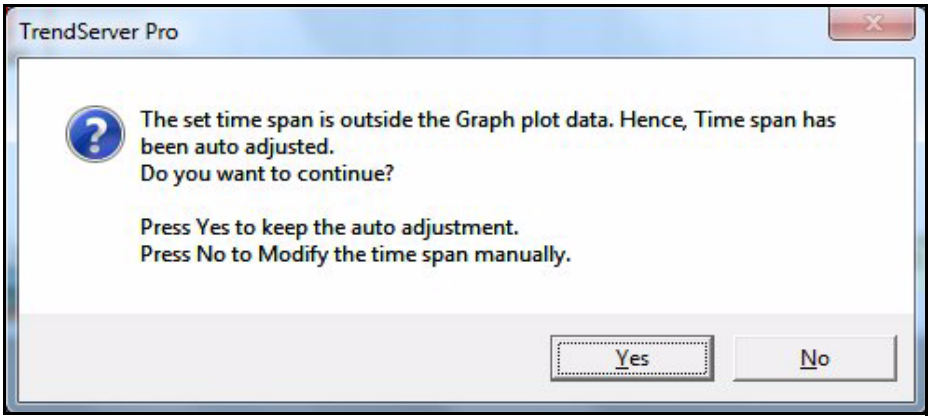
Scale panels may be reduced or increased in size by using the resize handles, indicated by a small bar at the top and bottom of the scale panel, see *Figure 9.6 on page 211*. Move the cursor over either handle, ***Trend Analysis Software*** changes the appearance of the cursor from a pointer to a double headed arrow, drag until the required size is achieved and drop.

The area used within the graph window, to display a pen’s data, is dependent upon the size of the respective scale panel. If a scale panel is increased by 100% in length, the area used to display that data will also increase by 100%.

Graph Set Time Span

This button, on the switches panel, *Figure 9.3 on page 206,* produces a box where the user can specify an exact start time, date and span of the current graph to be displayed. It is also possible to view the most recent data using the Go to Last drop down box.

Select any option from Go To Last drop down box and click ok it will show the below message.


TrendServer Pro
The set time span is outside the Graph plot data. Hence, Time span has been auto adjusted.
Do you want to continue?
Press Yes to keep the auto adjustment.
Press No to Modify the time span manually.
Yes
No

Graphing Events

To display Events on a graph, activate the ***Events*** button below the window displaying the graphed scales. This will enable a blue events bar at the top of the graph area. The events bar displays single icons representing one type of event or a grey numbered tile which indicates multiple events have occurred. A green numbered tile also indicates multiple events but one or more of the events is the start of a batch. If >100 is displayed in a number tile, this means 100 or more events have occurred during its span. These can only be viewed when the box reads <100. This is done by zooming in on the graph using the eyeglass cursor that appears in the Time/Date bar and clicking the left mouse button, or by using the Event filter.

Click on an icon in the Events bar to display details of that particular event. Click on the grey numbered tile to produce the ***Select Events*** box. This displays all the events within that tile span. Select an event from the list and press OK and details of that event will be displayed on the graph.

Realtime and Logged data via Modbus will not display Events on the **X Series** recorders.

Single event icons, displayed in the events bar, represent different events:

- Recorder with a green screen - A normal system message.
- Recorder with an orange screen - A system warning.
- Recorder with a red screen - A system problem.
- Bell - An alarm (yellow if the alarm is active).
- Flag - A marker.
- Person - User generated text.
- Light bulb - Digital input or relay (illuminated when active).

Batch Event icons

- Red square - End of batch
- Green arrow - Start of batch
- Two red vertical line - Pause batch

- Green line and an arrow - Resume batch
- Red cross - Abort batch
- Blue pin - Comment or other batch events eg. User ID, Lot number

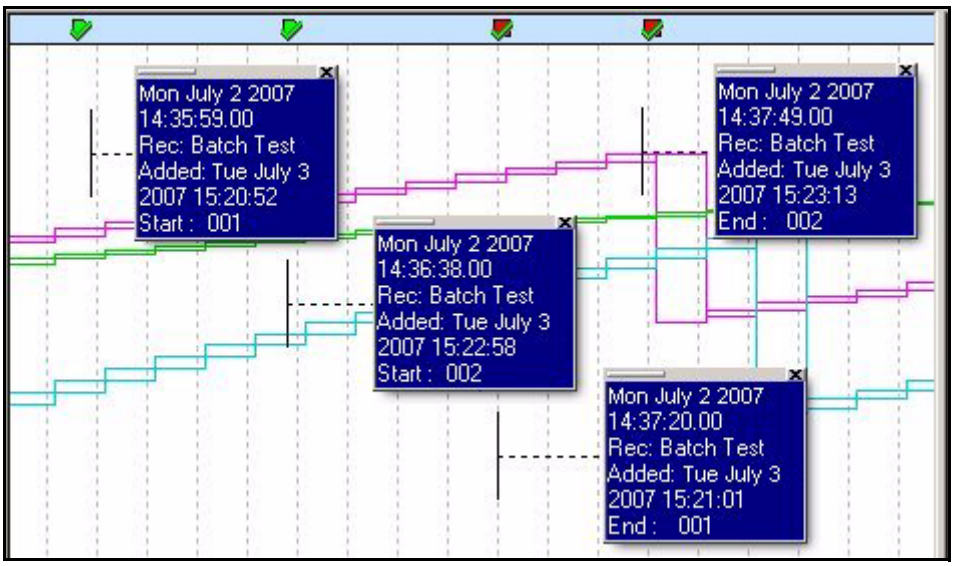
Event Interaction

Be careful when adding Batch events. Starting a second batch before the first batch has ended will cause the first batch to end where the second batch starts. However, in the latest version of software (June 07 onwards) concurrent batches are possible, so batches can overlap.

In this example batch 002 has been started before batch 001 has ended, this will make batch 001 end where batch 002 starts and batch 002 will end at the next available End command which is the marker to end batch 001.

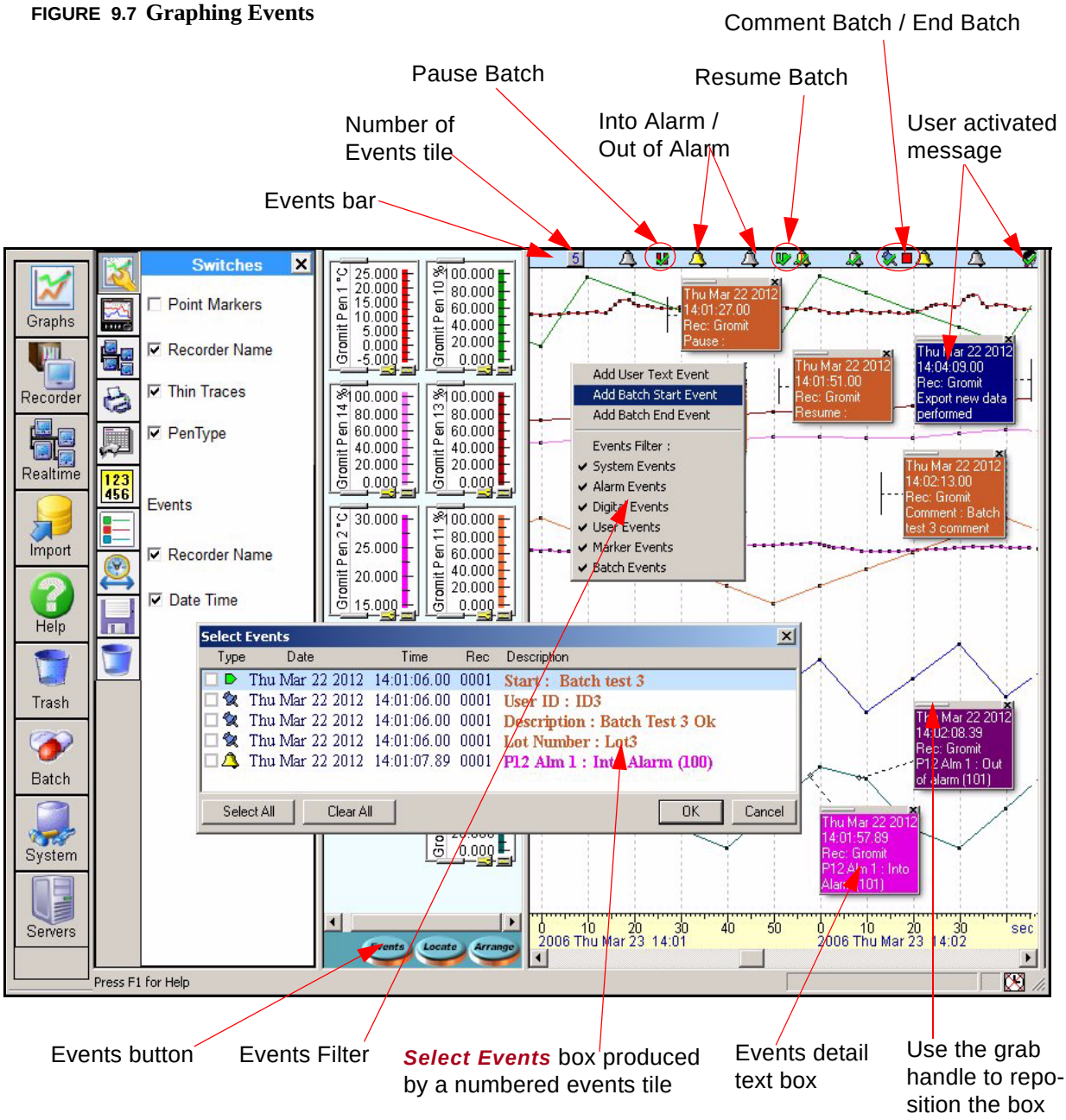
Start 001 Start 002

End 001 End 002



.

FIGURE 9.7 Graphing Events

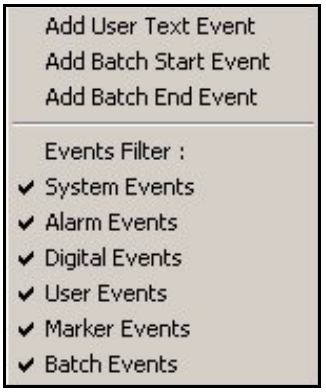

Comment Batch / End Batch
Pause Batch
Resume Batch
Number of Events tile
Into Alarm / Out of Alarm
User activated message
Events bar
Switches
Point Markers
Recorder Name
Thin Traces
PenType
Events
Recorder Name
Date Time
Graphs
Recorder
Realtime
Import
Help
Trash
Batch
System
Servers
Add User Text Event
Add Batch Start Event
Add Batch End Event
Events Filter :
System Events
Alarm Events
Digital Events
User Events
Marker Events
Batch Events
Select Events
Type Date Time Rec Description
Thu Mar 22 2012 14:01:06.00 0001 Start : Batch test 3
Thu Mar 22 2012 14:01:06.00 0001 User ID : ID3
Thu Mar 22 2012 14:01:06.00 0001 Description : Batch Test 3 Ok
Thu Mar 22 2012 14:01:06.00 0001 Lot Number : Lot3
Thu Mar 22 2012 14:01:07.89 0001 P12 Alm 1 : Into Alarm (100)
Select All
Clear All
OK
Cancel
Thu Mar 22 2012 14:01:27.00 Rec: Gromit Pause :
Thu Mar 22 2012 14:01:51.00 Rec: Gromit Resume :
Thu Mar 22 2012 14:04:09.00 Rec: Gromit Export new data performed
Thu Mar 22 2012 14:02:13.00 Rec: Gromit Comment : Batch test 3 comment
Thu Mar 22 2012 14:02:08.39 Rec: Gromit P12 Alm 1 : Out of alarm (101)
Thu Mar 22 2012 14:01:57.89 Rec: Gromit P12 Alm 1 : Into Alarm (101)
Gromit Pen 1 °C
Gromit Pen 10 %
Gromit Pen 14 %
Gromit Pen 13 %
Gromit Pen 2 °C
Gromit Pen 11 %
2006 Thu Mar 23 14:01
2006 Thu Mar 23 14:02
sec
Press F1 for Help
Events button
Events Filter
Select Events box produced by a numbered events tile
Events detail text box
Use the grab handle to reposition the box

Explaining an Events Graph

When an event is selected from the event bar a coloured text box will appear. Text boxes, user defined or linked to an event, can be dragged and re-positioned anywhere on the graph. Each text box has a grab handle in the top left corner and a close box (X) in the top right corner. Hovering the cursor over the grab handle will cause it to changes to a white hand. A dotted leader line will appear from the Event box to where the event occurred on the graph, the Event box can now be repositioned on the graph. The leader line can be moved in the vertical plane by clicking and holding the end bar. For alarms, the dotted line will point to the place where the pen was triggered. User text boxes will be saved to all recorders being graphed in that window.

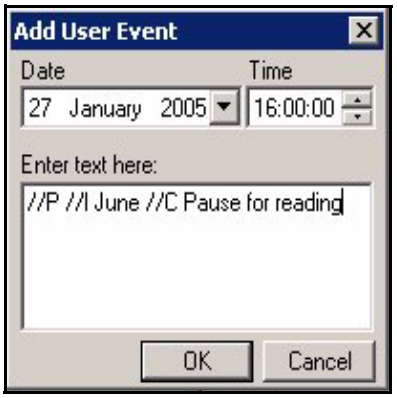
Events Filter

Use the ***Events Filter*** to display only the type of event you want to view, such as Alarm, User, or Batch. *Figure 9.7 on page 215.*



Right click on the Events bar at the top of the graph to produce the Events Filter menu. By default all the events are all set to be active. Click on the events to deactivate, these will not be displayed in the Event bar. Click directly on an event icon, (e.g. the bell icon represents the event is an alarm), this will select that particular event, indicated by a tick. Once selected it will always be displayed even when that type of event has been filtered out.

Add User Text Event



This is selectable by right clicking on the Event bar, which will produce a box where you can select the Add User Text Event.

Depending on where you click on the Event bar will determine the time and date displayed in the box and the time and date that the User Event is displayed on the graph. The time and date can be changed using the drop down boxes. To change the date the drop down box will produce a monthly calendar. Select the month and click on the date. To change the time, first click on the hours, minutes or days then use the up and down arrows to change the time.

Enter text for any Event or add a Batch Event Marker. These User Text Event markers can be displayed on the either the Logged data/Disk data graph area or the Realtime graph area. **Maximum characters = 43 including spaces.**

User defined text can be added to any graph retrospectively. The text entered will appear with that event. The time and date will automatically be added to the text displayed.

Batch markers can be retrospectively created in historical data. Once entered, a User text event cannot be erased. *See "Retrospectively Graphing a Batch" on page 219*

For details on setting up Events using ***Trend Analysis Software***, see *"Events System" on page 135*

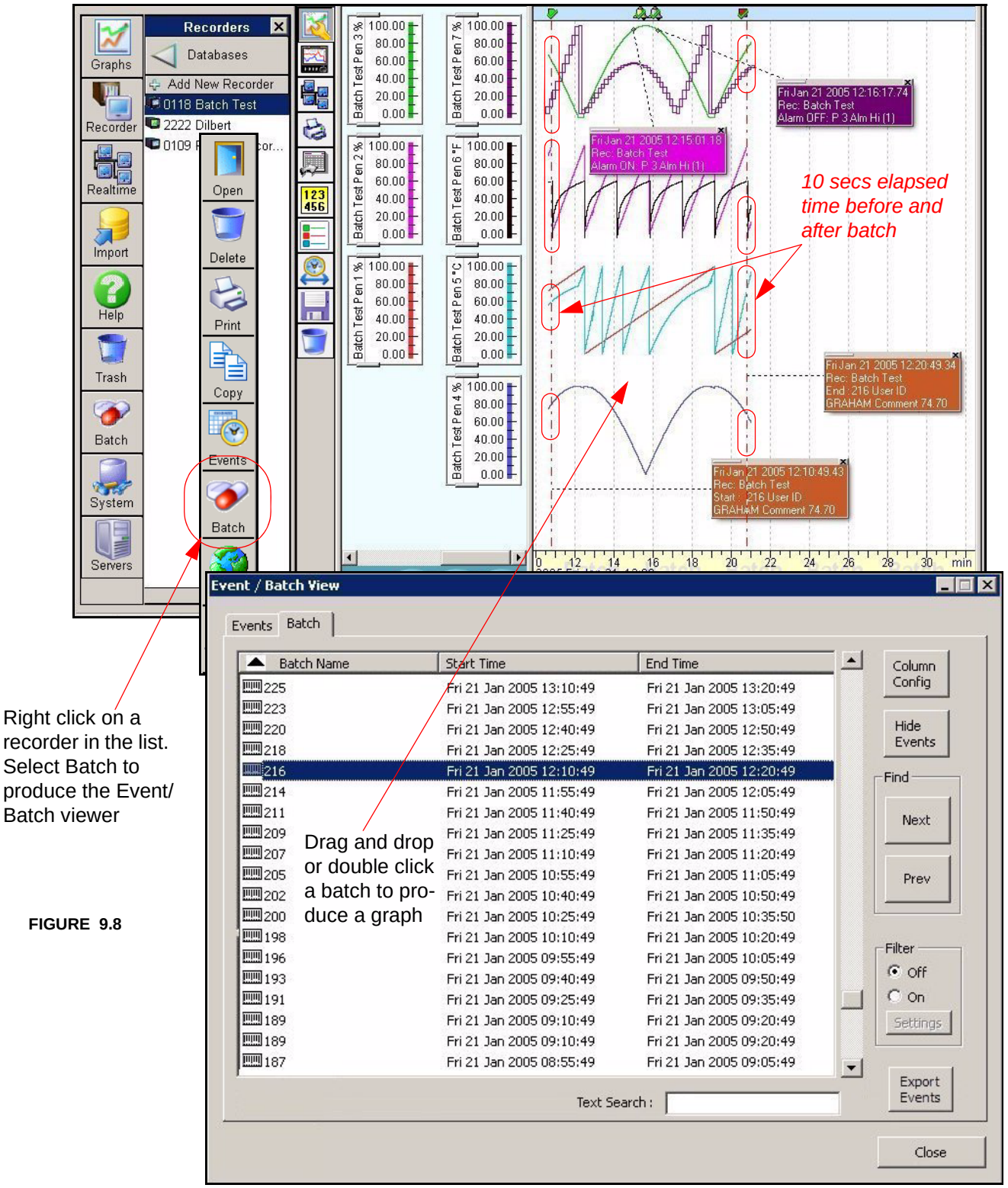
Graphing a Batch

Individual batches can be graphed by right clicking on the appropriate recorder in the recorders list and selecting Batch from the tool bar. The Event/Batch View window will appear with the Batch tab displaying all the Batches for that particular recorder. Either select a batch and drag and drop it onto the graph area or double click on the start of a specific batch. The graph data being displayed will only be for that batch. All events, including batch events will be displayed when the Event bar is activated.

The batch area is contained within two red dotted lines denoting the start and the end of, in this case, batch 216.

A Batch graph can be quickly identified by the word "Batch" displayed in the time bar at the bottom of the graph.

There is an elapsed time of 10 seconds before the batch is started and when the batch has ended.


Recorders
Databases
Add New Recorder
0118 Batch Test
2222 Dilbert
Graphs
Recorder
Realtime
Import
Help
Trash
Batch
System
Servers
Open
Delete
Print
Copy
Events
Batch
10 secs elapsed time before and after batch
Event / Batch View
Events
Batch
Batch Name
Start Time
End Time
225 Fri 21 Jan 2005 13:10:49 Fri 21 Jan 2005 13:20:49
223 Fri 21 Jan 2005 12:55:49 Fri 21 Jan 2005 13:05:49
220 Fri 21 Jan 2005 12:40:49 Fri 21 Jan 2005 12:50:49
218 Fri 21 Jan 2005 12:25:49 Fri 21 Jan 2005 12:35:49
216 Fri 21 Jan 2005 12:10:49 Fri 21 Jan 2005 12:20:49
214 Fri 21 Jan 2005 11:55:49 Fri 21 Jan 2005 12:05:49
211 Fri 21 Jan 2005 11:40:49 Fri 21 Jan 2005 11:50:49
209 Fri 21 Jan 2005 11:25:49 Fri 21 Jan 2005 11:35:49
207 Fri 21 Jan 2005 11:10:49 Fri 21 Jan 2005 11:20:49
205 Fri 21 Jan 2005 10:55:49 Fri 21 Jan 2005 11:05:49
202 Fri 21 Jan 2005 10:40:49 Fri 21 Jan 2005 10:50:49
200 Fri 21 Jan 2005 10:25:49 Fri 21 Jan 2005 10:35:50
198 Fri 21 Jan 2005 10:10:49 Fri 21 Jan 2005 10:20:49
196 Fri 21 Jan 2005 09:55:49 Fri 21 Jan 2005 10:05:49
193 Fri 21 Jan 2005 09:40:49 Fri 21 Jan 2005 09:50:49
191 Fri 21 Jan 2005 09:25:49 Fri 21 Jan 2005 09:35:49
189 Fri 21 Jan 2005 09:10:49 Fri 21 Jan 2005 09:20:49
189 Fri 21 Jan 2005 09:10:49 Fri 21 Jan 2005 09:20:49
187 Fri 21 Jan 2005 08:55:49 Fri 21 Jan 2005 09:05:49
Text Search :
Column Config
Hide Events
Find
Next
Prev
Filter
Off
On
Settings
Export Events
Close

Right click on a recorder in the list. Select Batch to produce the Event/ Batch viewer

Drag and drop or double click a batch to produce a graph

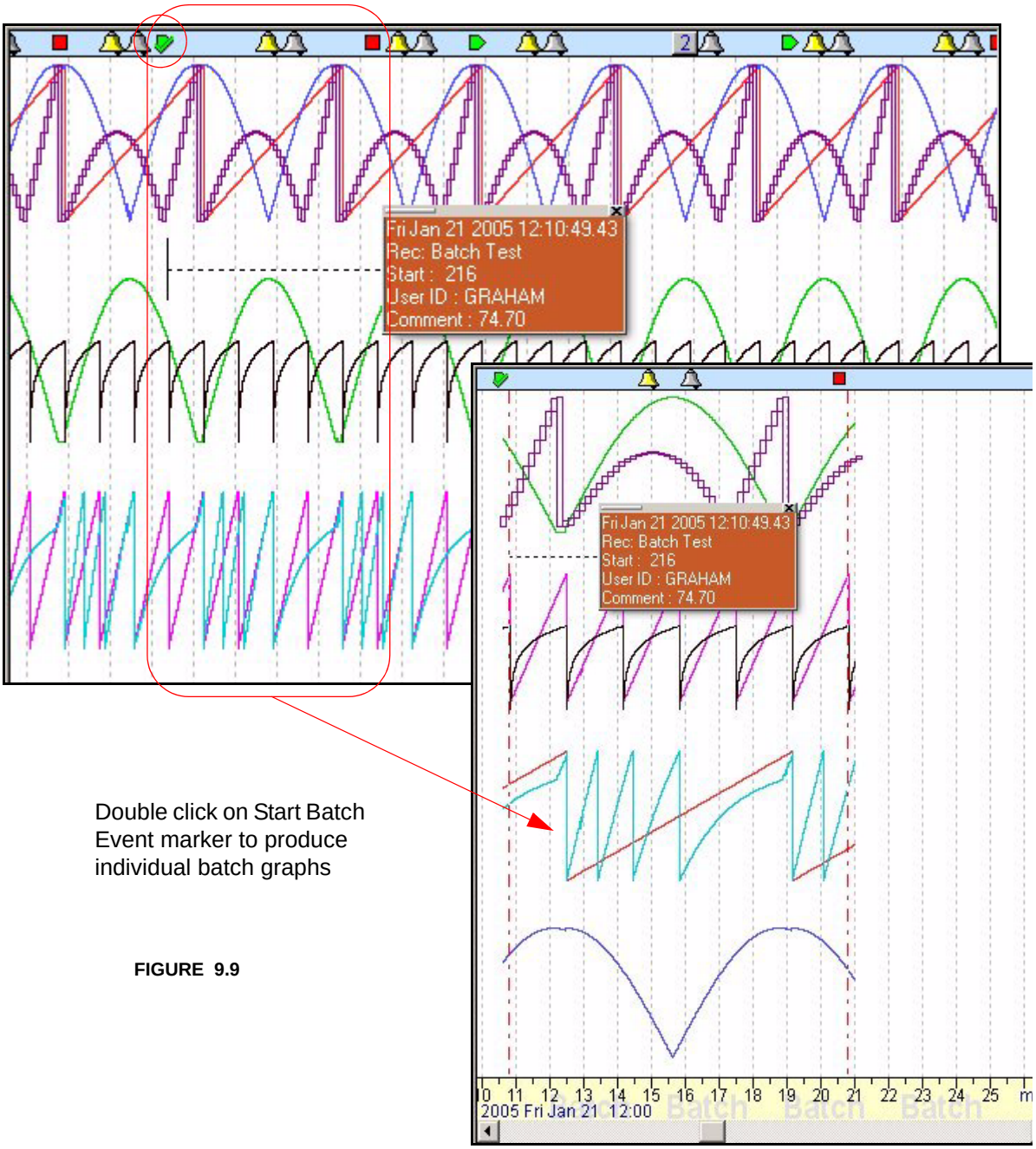
FIGURE 9.8

Another way to graph a batch is to double click on one of the batch event markers in the event bar. If it is a green tile this means one or more batches will have started, double click to produce the event list to select the desired batch.

If data is downloaded part way through a batch the batch graph will display the start of the batch and a red dotted line showing where the batch was interrupted.

The Batch graph will prompt to be saved, by default, as the Batch Name or it can be renamed. Load the same batch more than once and the Batch graph will be renamed with a suffix -001, -002 etc.

Even if the graph is not saved the Events are entered into the database.



Double click on Start Batch Event marker to produce individual batch graphs

FIGURE 9.9

Retrospectively Graphing a Batch

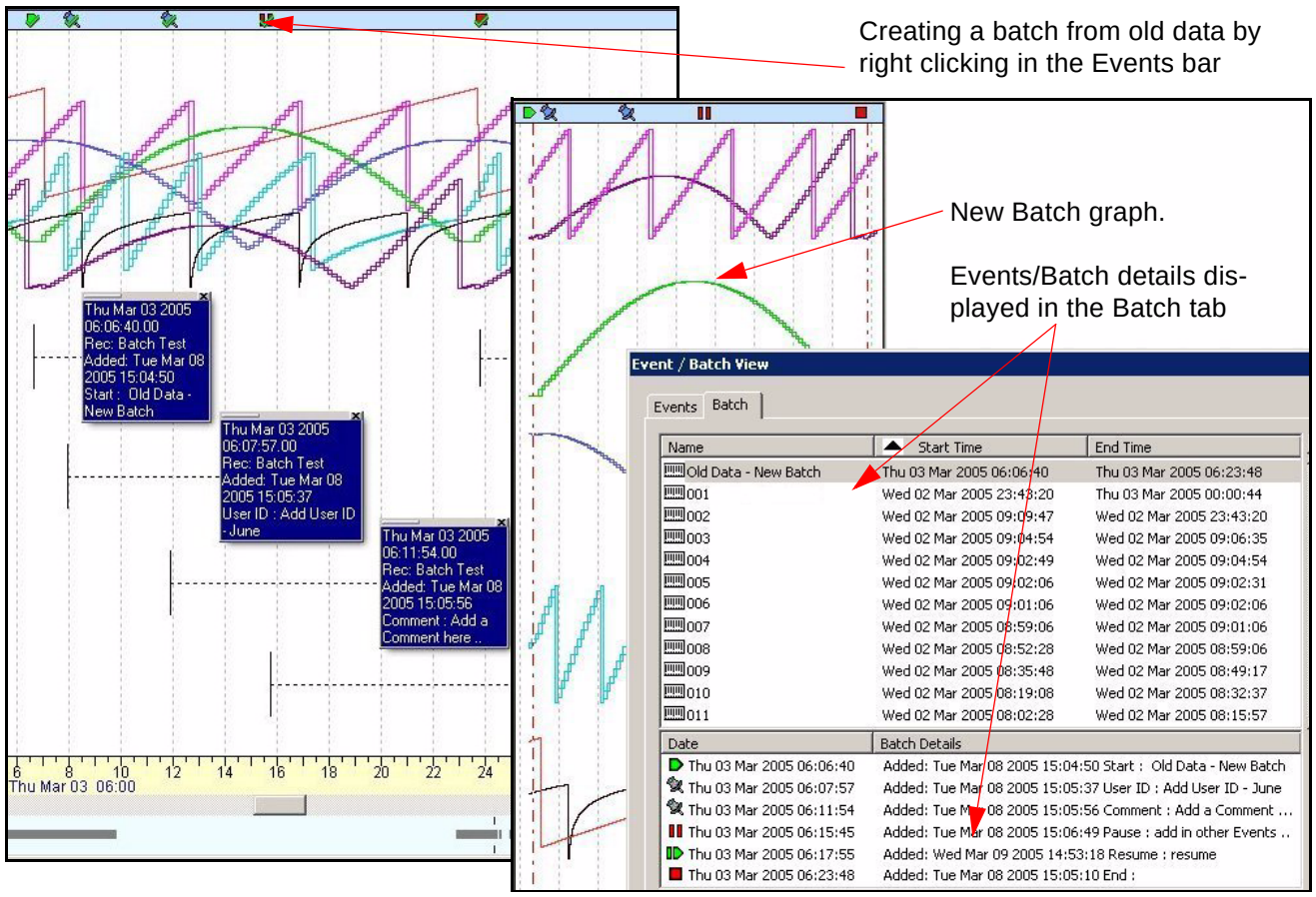
Batch graphs can be created from existing data. The Events and batch information can be viewed and exported to a spreadsheet in just the same way for batches that are created before the data is graphed.

- Open a graph showing the required data and go to the Events bar at the top of the graph.
- In the Events bar the cursor will change to a hand, To start a batch, right click in the Event bar at the approximate required location.
- Select Add Batch Start Event and enter the required time and date plus any batch information. Do the same for the End Batch and to add any other User Event.
- All other Batch Control Events can be used in Add User Event. Use //C to add in a Comment, //I for User ID, //D to add in a Description etc.
- The Events will show in the Event bar with their corresponding icon. To save the graph close it, click yes to save and rename if you wish.

To create a separate batch graph from this, right click on the recorder the graph was created from in the recorders list and select the batch button from the tool bar. Or you can select the Batch button from the main tool bar for all the recorders.

Find your batch in the list and double click or drag the batch onto the graph area. Additional batch information can be added at this stage by right clicking in the Event bar.

To view the event information for this batch graph select the batch required in the Batch tab and select the Show/Hide Events.


Creating a batch from old data by right clicking in the Events bar
New Batch graph.
Events/Batch details dis-played in the Batch tab
Thu Mar 03 2005 06:06:40.00 Rec: Batch Test Added: Tue Mar 08 2005 15:04:50 Start : Old Data - New Batch
Thu Mar 03 2005 06:07:57.00 Rec: Batch Test Added: Tue Mar 08 2005 15:05:37 User ID : Add User ID - June
Thu Mar 03 2005 06:11:54.00 Rec: Batch Test Added: Tue Mar 08 2005 15:05:56 Comment : Add a Comment here ..
6 8 10 12 14 16 18 20 22 24
Thu Mar 03 06:00
Event / Batch View
Events
Batch
Name
Start Time
End Time
Old Data - New Batch
Thu 03 Mar 2005 06:06:40
Thu 03 Mar 2005 06:23:48
001
Wed 02 Mar 2005 23:43:20
Thu 03 Mar 2005 00:00:44
002
Wed 02 Mar 2005 09:09:47
Wed 02 Mar 2005 23:43:20
003
Wed 02 Mar 2005 09:04:54
Wed 02 Mar 2005 09:06:35
004
Wed 02 Mar 2005 09:02:49
Wed 02 Mar 2005 09:04:54
005
Wed 02 Mar 2005 09:02:06
Wed 02 Mar 2005 09:02:31
006
Wed 02 Mar 2005 09:01:06
Wed 02 Mar 2005 09:02:06
007
Wed 02 Mar 2005 08:59:06
Wed 02 Mar 2005 09:01:06
008
Wed 02 Mar 2005 08:52:28
Wed 02 Mar 2005 08:59:06
009
Wed 02 Mar 2005 08:35:48
Wed 02 Mar 2005 08:49:17
010
Wed 02 Mar 2005 08:19:08
Wed 02 Mar 2005 08:32:37
011
Wed 02 Mar 2005 08:02:28
Wed 02 Mar 2005 08:15:57
Date
Batch Details
Thu 03 Mar 2005 06:06:40
Added: Tue Mar 08 2005 15:04:50 Start : Old Data - New Batch
Thu 03 Mar 2005 06:07:57
Added: Tue Mar 08 2005 15:05:37 User ID : Add User ID - June
Thu 03 Mar 2005 06:11:54
Added: Tue Mar 08 2005 15:05:56 Comment : Add a Comment ...
Thu 03 Mar 2005 06:15:45
Added: Tue Mar 08 2005 15:06:49 Pause : add in other Events ..
Thu 03 Mar 2005 06:17:55
Added: Wed Mar 09 2005 14:53:18 Resume : resume
Thu 03 Mar 2005 06:23:48
Added: Tue Mar 08 2005 15:05:10 End :

Realtime Graphing

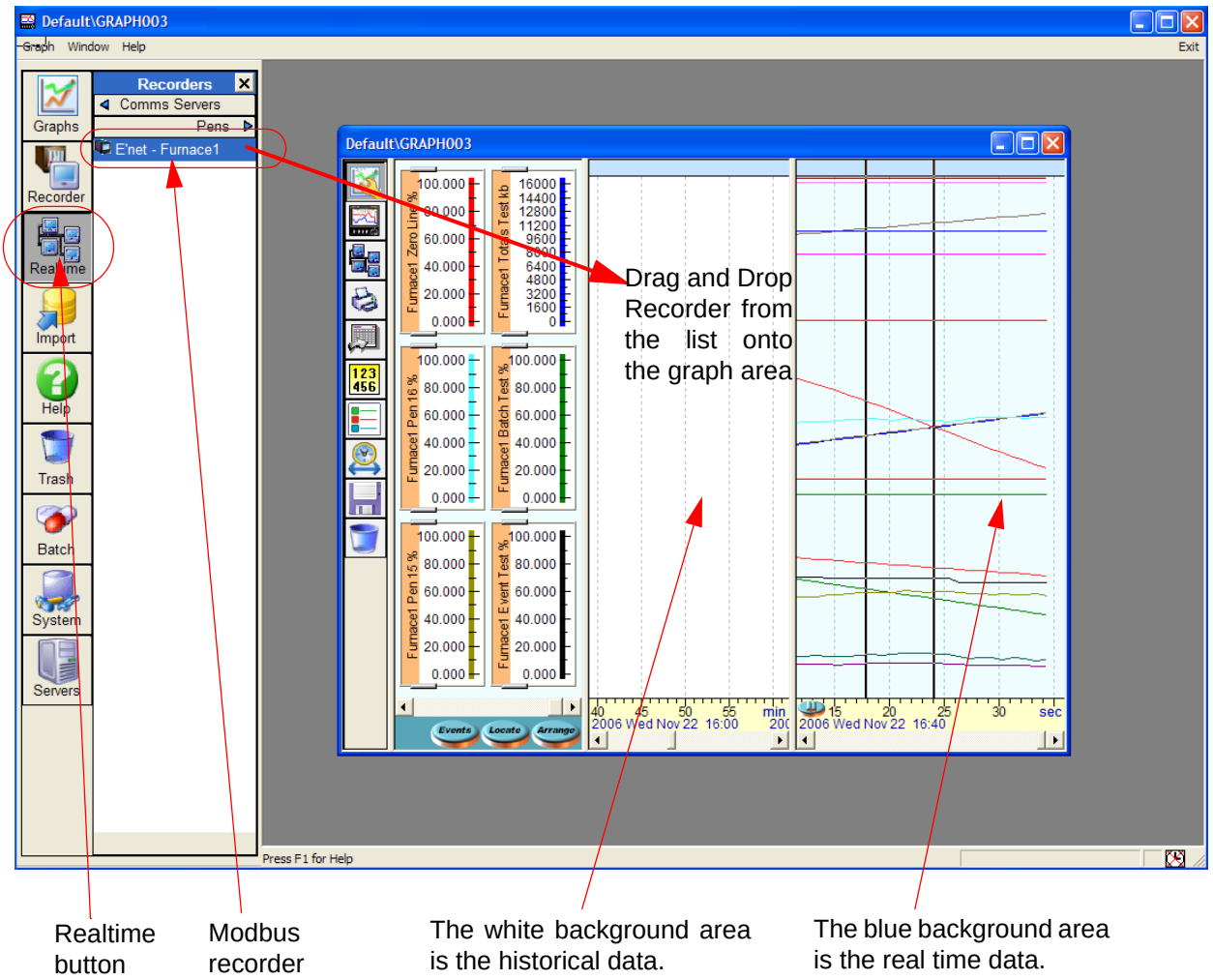
Realtime Graphing

To graph real-time data on **Trend Server**, press the “Real-time” button located on the left hand side. This will list all the recorders currently connected. The recorder set up on Modbus will be in the list. The recorder will be in the list under the name that you gave it when entering the device details.

Either click and drag the recorder name from the list to the graph area, this will add all the recorders pens onto the graph, or click on “pens”, to list the pens available and drag the required ones onto the graph.

As soon as the pens are on the graph they should start to update in real-time. The graph will be split into two as below.

Figure 9.9 Realtime Graphing

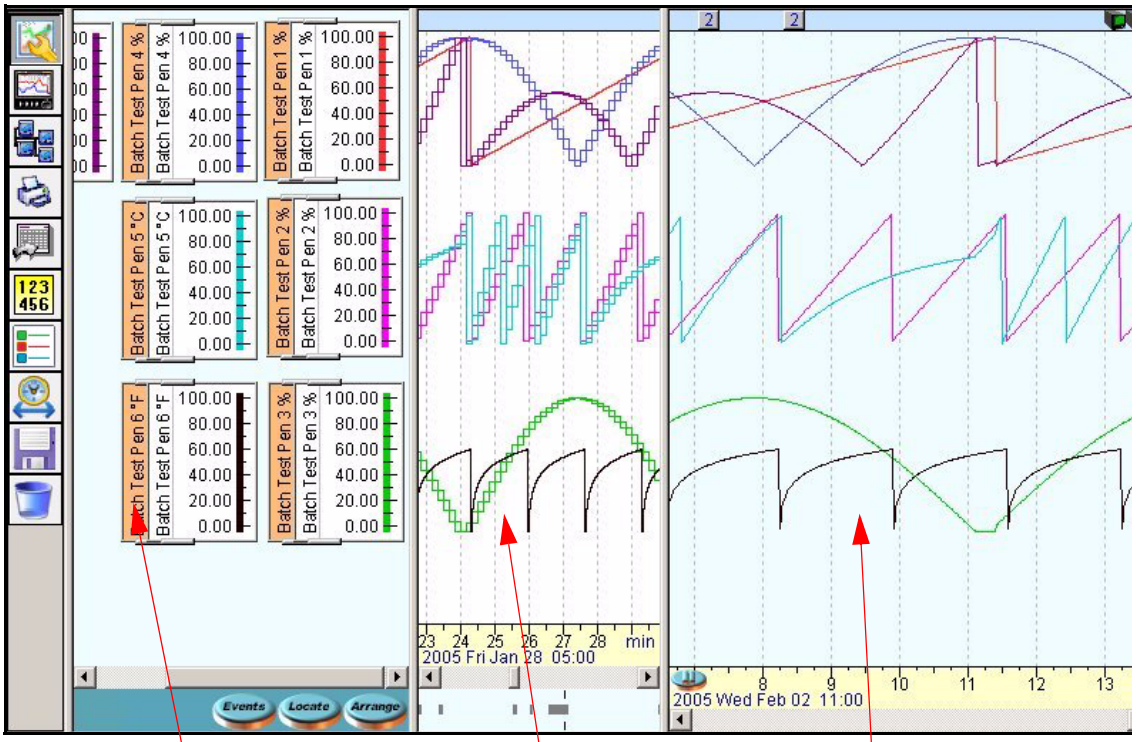


The white area for historical data will display the data that is stored to the database. At this point we have no data being stored to the database, it is simply being acquired and graphed, if the graph is closed any data downloaded via Modbus will be lost.

Graphing Realtime Data

Only data can be sent via Modbus, so no recorder configurations or events are sent for Realtime and Logged data for the **X Series** and **GR** recorders.

FIGURE 9.10 Graph using data via Trendbus



Realtime pens shown in orange

Logged data or data from a disk (white scale)

Realtime data from the same recorder

To display realtime data on a graph left click on the ***Realtime*** icon from the tool bar down the left side of the main screen. This will produce the ***Recorders pane*** displaying the recorders that are available. Click on the Comms server tab to view a list of the servers. The Pens tab will display which pens are available on the recorder.

- Either, select the recorder from the list and drag it across the screen into the blank graph area, this will display all the pens on the recorder. Or, alternatively, select the ***Pens*** label at the top of the ***Recorders pane*** and select individual pens and drag them on to the blank graph area.
- Maximise the graph and use the ***Arrange*** button, at the bottom of the graph screen, to organise the pen traces and scales. The graph is split into two areas. The area to the right, with a blue tint, is the realtime graph area. The white area between the scale and the realtime graph area is for graphing logged or historical data. *See "Graphing Realtime Data" on page 222*

- If there is no data being displayed in the realtime graph area, check the comms server is active, then check the comms server status to see if the recorder is ***Talking*** or ***Waiting***. If there is still no realtime data being graphed, check to see if the pause button at the bottom of the realtime graph area has been activated, if so, click to deactivate.
- Data will graph across the screen from right to left, the furthest point to the right showing the current time. Place the cursor in the ***Date/time bar*** running along the bottom of the graph area. use the right and left mouse buttons to zoom in and out on the data. Ensure the time is synchronised between the recorder and PC. The time displayed on the graph is the time set on the recorder, where ever in the world it may be. *See "Realtime graphing across Time Zones" on page 223*

- Right click in the graph area to produce the ***Digital Values*** cursor, hold the right mouse button down to drag the cursor to any point in the graph area.

Batch Events in Realtime **(only available for *100 or 180 mm* recorders)**

Adding Batch Events or User Text events to Realtime data can only be done in the historic data window.

Pause button

The ***Pause*** button stops the automatic scrolling, the data will continue to arrive in realtime, but the current time will stop on the right side of the screen. This is to help the user review the realtime data that has passed off the graph to the left. The ***Horizontal scroll bar*** at the bottom of the screen can be used to scroll back and survey the previous data. To zoom in on a specific area of data, left click the mouse button, hold and drag over the selected area in the ***Time/date zone*** at the bottom of the graph area.

When the pause button is deactivated the auto scrolling will resume and the current time will be displayed at the furthest point on the right side of the screen. Only time is frozen, no data is lost, this includes event data if this option has been selected.

Realtime graphing across Time Zones

Realtime graphed data appears from the right hand edge of the screen and scrolls to the left. The right hand edge represents the time 'Now'. If an event or a spike occurs it will happens at the same moment you see it appear on the graph. The time may not be the same as the date line shows on the graph. The recorder has to be synchronised with the PC through the same Comms Server.

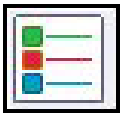
Retrieving data via another Comms Server may give a different time setting. If the user is accessing data from a recorder in a different time zone, the time displayed on the graph will be the time set for the PC.

Example: User UK1 wishes to access data using the software on his PC in the United Kingdom, the data is on a recorder in Washington D.C. USA. The Comms Server in the US is synchronised, at US time, with the recorder. User UK1 sees an event occurs at 4.00pm (UK time) on the graph it would actually have happened at 11.00 am on the recorder in Washington D.C. The graph will show the time lines as for real UK time.

Data logged to disk will store the time as displayed on the PC and the recorder once they have been synchronised.

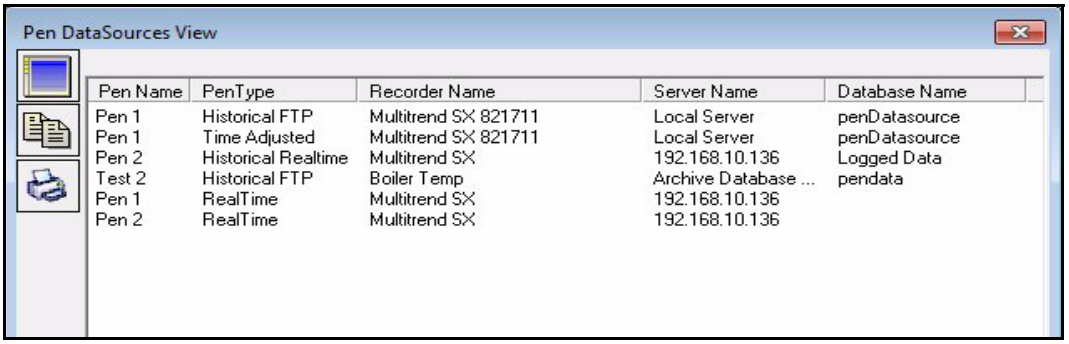
For specific help, click on any part of the graph and press the F1 key on your keyboard to display the related help files.

Graph Pen Data Source Viewer



Select this icon from the left side of the graph to view all the sources related to the pens for that graph. This will provide information like PenName, PenType, RecorderName, DatabaseName, ServerName.

The icons on the left are, Select all, does exactly that. Copy selected data to clipboard copies the selected data on to the Windows clipboard for pasting into such as Microsoft™ Word or Excel. To Print selected data click on the Print icon to generate two boxes, one to select the font required, then click OK followed by the print setup box.



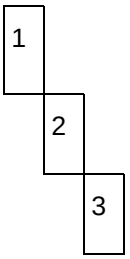
Pen Name	PenType	Recorder Name	Server Name	Database Name
Pen 1	Historical FTP	Multitrend SX 821711	Local Server	penDatasource
Pen 1	Time Adjusted	Multitrend SX 821711	Local Server	penDatasource
Pen 2	Historical Realtime	Multitrend SX	192.168.10.136	Logged Data
Test 2	Historical FTP	Boiler Temp	Archive Database ...	pendata
Pen 1	RealTime	Multitrend SX	192.168.10.136	
Pen 2	RealTime	Multitrend SX	192.168.10.136	

Graph Data Viewer

Select this icon from the left side of the graph area to view data as a table. The ***Data Viewer*** either displays an overview of data (every pixel) currently visible in the graph window showing times and values that have been averaged, or as actual data points for the same span. The left column displays the time and date of each data value.

This example show 3 pixels and their widths measured in max/min time readings

The screen area may span 1000 pixels and each pixel may contain 100 data points. This can all be viewed by the ***Data Viewer*** using ***Actual logged Data Mode***. The ***Overview mode*** gives a minimum and maximum reading per pixel effectively compressing all the data points in the pixel. On the Overview mode the time between each reading is divided up evenly from the width of the graph.



Pixel 1 width
15.02.40.0000 min reading
15.03.19.9999 max reading

Pixel 2 width
15.03.20.0000 min reading
15.03.99.9999 max reading

Pixel 3 width
15.04.00.0000 min reading
15.04.39.9999 max reading

Each of the other columns represents an individual pen trace on the graph. If there is no data available, a dash will appear. Single data values will be present in the column unless the pen trace is only logging Min/Max data values, in which case there will be two values in the column separated by a comma. Even if the data has not been set up to log min/max readings the data viewer will do this in the Overview Mode.

If an asterisk* is displayed after the value in overview mode, this indicates that the data values have changed from the previous line. If an asterisk* is displayed in actual data mode, the value was sampled at the time specified on that line.

Data Viewer in Overview mode

Remove recorder name from columns

Actual logged data

Select all

Copy selected data to the clipboard

Print the selected data

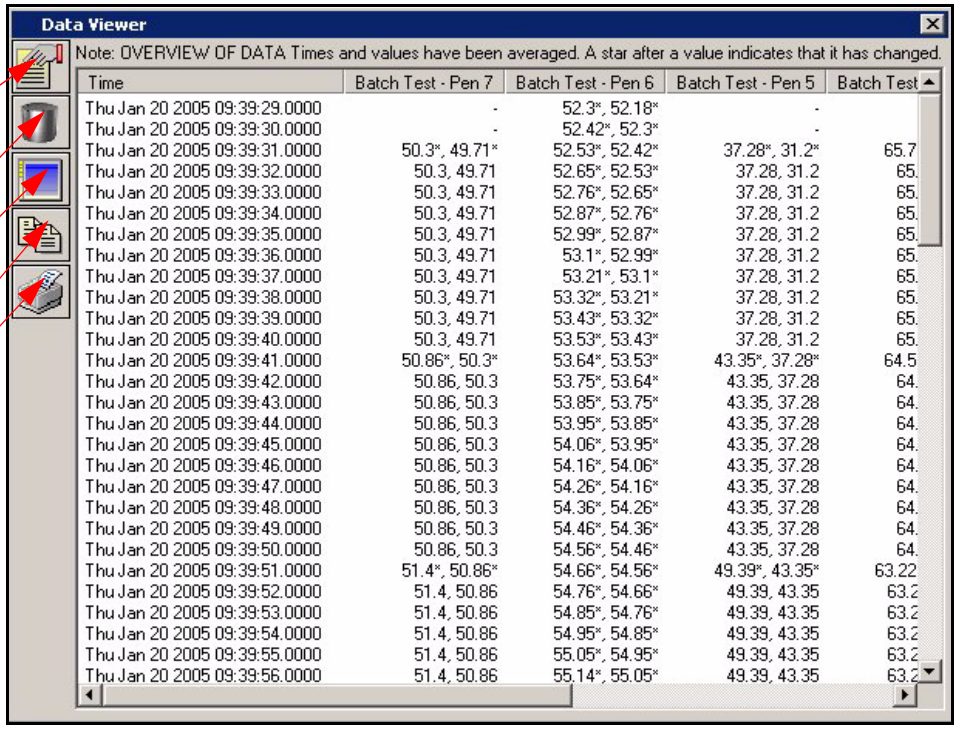


FIGURE 9.11

Data Viewer in Actual Logged Data mode

Displaying data from the same graph and time as the overview mode.

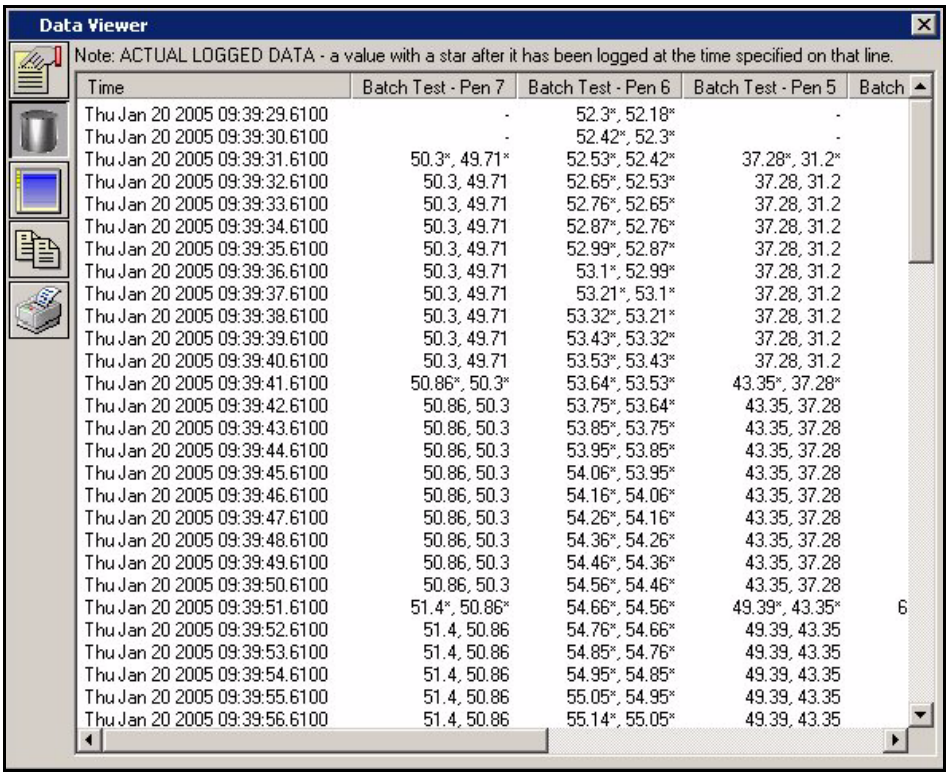


FIGURE 9.12

Use the bottom and side scroll bars to reveal all pens and more data values. To re-arrange the columns, place the cursor in between the column headings until a double headed arrow appears. Click and hold down the left mouse button and move the column left or right. Rows of data can be selected by holding down the CTRL key and clicking on the columns required. To select all data, hold down the SHIFT key and select the first and last row required, or use the ***Select all*** icon.

The icons, displayed on the left, are ***Remove recorder name from columns,*** this can be used to hide the name to allow more column space. ***Show all of the data,*** this is not an overview, this is **all** the actual data points.

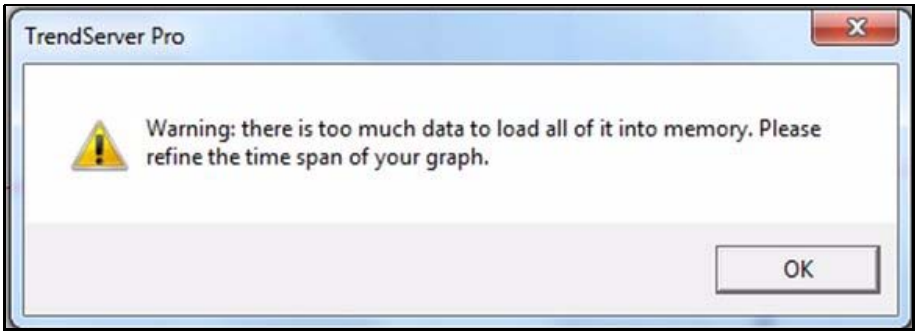
NB. When using this as it will reveal **all** the data, this could produce a huge list or even refuse and will ask you to resize the graph.

Select all, does exactly that. ***Copy selected data to clipboard*** copies the selected data on to the Windows clipboard for pasting into such as Microsoft™ Word or Excel. To ***Print selected data*** click on the Print icon to generate two boxes, one to select the font required, then click OK followed by the print setup box.

According to your version of Windows, the amount of data might reach the maximum size of the clipboard and some lines will be clipped off.

Click in any area on the screen and press F1 on the keyboard to display the related help files.

The Data Viewer will prompt with the warning message below when data point exceeds 1000 for each pen or total data points exceeding 20000.



Printing graphs

To ***Print a graph*** simply click on the print icon and select either standard print or legend print, or select print from the graph drop down menu running along the top of the screen. The latter gives you the option of print preview where the graphs can be viewed in both forms. The standard print will print the graph as displayed on the screen. Legend print adds an information box at the bottom of the graph identifying the graph name, recorder ID number, recorder name and recorder description.

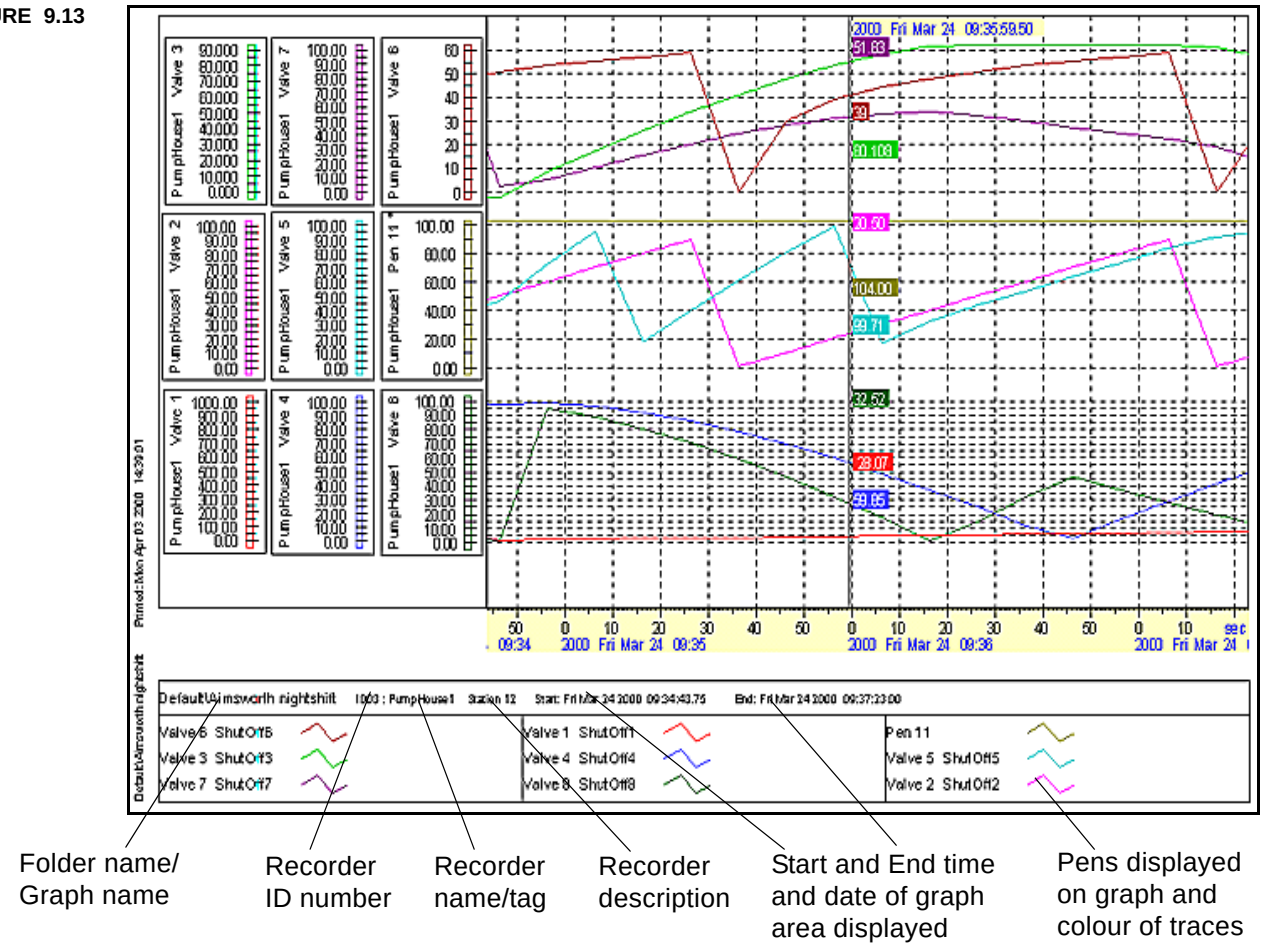
Also displayed are all the pens used, showing each pen trace (in colour) with the pen tag/name and pen description. The legend print shows exact start and stop time and dates. The legend details are taken from information entered during the recorder, pen and graph set ups.

Both graphs will print vertical background lines according to the time span, and horizontal lines depicting the scale range. With different scale ranges, the horizontal lines displayed are from the scales nearest to the right hand edge of the scale area. The scale lines are determined by the "major grads" as defined in the setup of the recorder.

Use the ***Arrange button*** to ensure the scales down the right hand edge of the scale area are exactly in line. Go to Graph, Print preview to check all scale lines are visible, if some scale lines are missing the scales cannot be in line.

To change the print settings, have the graph open, select ***Graph*** from the drop down menu running along the top of the screen and select ***Print Preferences.*** Click in any area on the screen and press F1 on the keyboard to display the related help files.

FIGURE 9.13


Folder name/ Graph name
Recorder ID number
Recorder name/tag
Recorder description
Start and End time and date of graph area displayed
Pens displayed on graph and colour of traces

Chapter 10: TrendView Historian Server Client Software

Software License Agreement

Refer to the **TrendView** Historian installer for the software license agreement. On start-up you will be required to agree to the Software License in order to proceed. *See "Software License Agreement" on page 229.*

TrendView Historian Support Information

1. **TrendView** Historian supports OPC Historical Data Access Specification 1.2. Any interfaces and functionality apart from specification 1.2 which are not supported. For more information please refer to **OPC HDA 1.20 Specification** by following this link http://www.opcfoundation.org/DownloadFile.aspx?RI=117
   - Anonymous, Interactive and All Users' access restricted for the TMS OPC HDA Server (i.e., **TrendView** Historian). Hence, all users may not be able to access it.
   - Only Local/Domain users who are added to user group 'TMSApplicationAccessGroup' on both machines, where ***Trend Server*** and OPC HDA client resides, are given access to TMS OPC HDA Server.
   - If the above step is not followed OPC Client(s) may get "Access Denied" error.
   - For Matrikon OPC Client, OPC ENUM DCOM object can be given security permissions for the ***Trend Analysis Software*** Users.
2. **TrendView** Historian does not support Alarms or Events. **TrendView** Historian is only for viewing historical data and no support is provided for annotations interface.
3. You need to provide start as well as end time to retrieve historical data. (Exception is Asynchronous methods ReadRaw(), ReadProcessed (),AdviseRaw(), AdviseProcessed(), where there is no need to provide end time)
4. To access historical data the start time should be less than end time.
5. **TrendView** Historian server will simply return "No Implementation" for any not supported interfaces and their related functionality to OPC HDA client.
6. There is no support for insert, replace of any data in to the **TrendView** database server.
7. **TrendView** Historian does not support (ReadAtTime for both Synchronous and Asynchronous interfaces) for retrieving data at a particular timestamp.
8. Quality in the case of synchronous and Asynchronous call will be set to Good i.e. OPC_QUALITY_GOOD by Default.
9. The Maximum returned values in Asynchronous and Synchronous call will be 20000. This means that OPC HDA client will get a maximum of 20000 pen values in one call at a time.
10. Clarification on most used methods and their usage:

- AdviseRaw() in Asynchronous will get all the historical data as well as updated from last updated interval till the current time. It means if the client has set interval of 10 seconds then AdviseRaw() will be called every 10 seconds to get the data from the HDA server.
- ReadRaw () in Asynchronous and will give data to the client in chunks (maximum limit of items at a time) until there is no data in HDA server. e.g.: If there are 1000 values in the **TrendView** Historian and if the setting is configured to get the maximum, up to 100 values in one read operation, then it will retrieve the first 100 values to client and will continue to get next 100 values untill it reaches 1000 at which time it will stop.
  OPC client will be responsive to user actions while performing this operation and getting data from the server meaning that user can perform any action on the client even if client is busy getting data from the server.
  In the case of Synchronous call, all 1000 values will be read at the same time. The user has to wait till the client gets these values from server. In other words, client will be locked up while getting these values from the server.
- ReadProcessed() in Synchronous and Asynchronous, this will return aggregates (min, max, average, interpolated) to the OPC client.
- AdviseProcessed() in Asynchronous and will return aggregates (min, max, average, interpolated) to the OPC client.
- Playback interface is same as Asynchronous AdviseRaw () only difference is that it will only give historical data and not the latest value.

TrendView Historian Installation

References for HDA Client and Supported Versions

1. Matrikon OPC HDA Explorer V1.1
2. Honeywell Experion PKS: Honeywell OPC Validator V1.1.0000
3. PI OPC HDA Client -V 1.20

Reference Manuals

OSIsoft -
OPC Data Access & Historical Data Access Server for the PI System

Vendor -
The OPC standards are freely available from the OPC Foundation at
http://www.opcfoundation.org.

Matrikon OPC HDA Explorer -
HDA Explorer is a free stand-alone tool for verifying historical data through HDA, testing HDA OPC Servers, and troubleshooting connectivity to HDA OPC Servers. www.matrikonopc.com

OPC Client Access to TrendView OPC Historian Server

A Windows-based Client application must be used to view and access historical data from ***Trend Manager*** software. There are various clients like Matrikon, Wonder ware, OSI-PI that are available that can be used for accessing historical data from the **TrendView** OPC Historian Server.

NOTE: When using an OPC Historian Client to connect to the TrendServer OPC Historian Server Version 100.1.0 or higher you will need to add the OPC Historian client user to the“TMSApplicationAccessGroup” if this has not already been done. Refer to Chapter 3 Installation for more details.

You can search for a remote machine where the **TrendView** OPC Historian server is present from the Client. Once the server machine is found by the client application, the OPC Client application may “Connect” to the **TrendView** OPC Historian server. In the most user-friendly client applications, the data items for the server may be “browsed” by the client for Tag selection into named data groups. In other less user-friendly OPC Client applications, the data items for a group are entered as tags via defined text strings. The tags defined then become OPC Tags in the application’s database. The recorder’s OPC server provides access to each of the defined active Pens (P1 to P96). Namespace for **TrendView** Historian is given below.

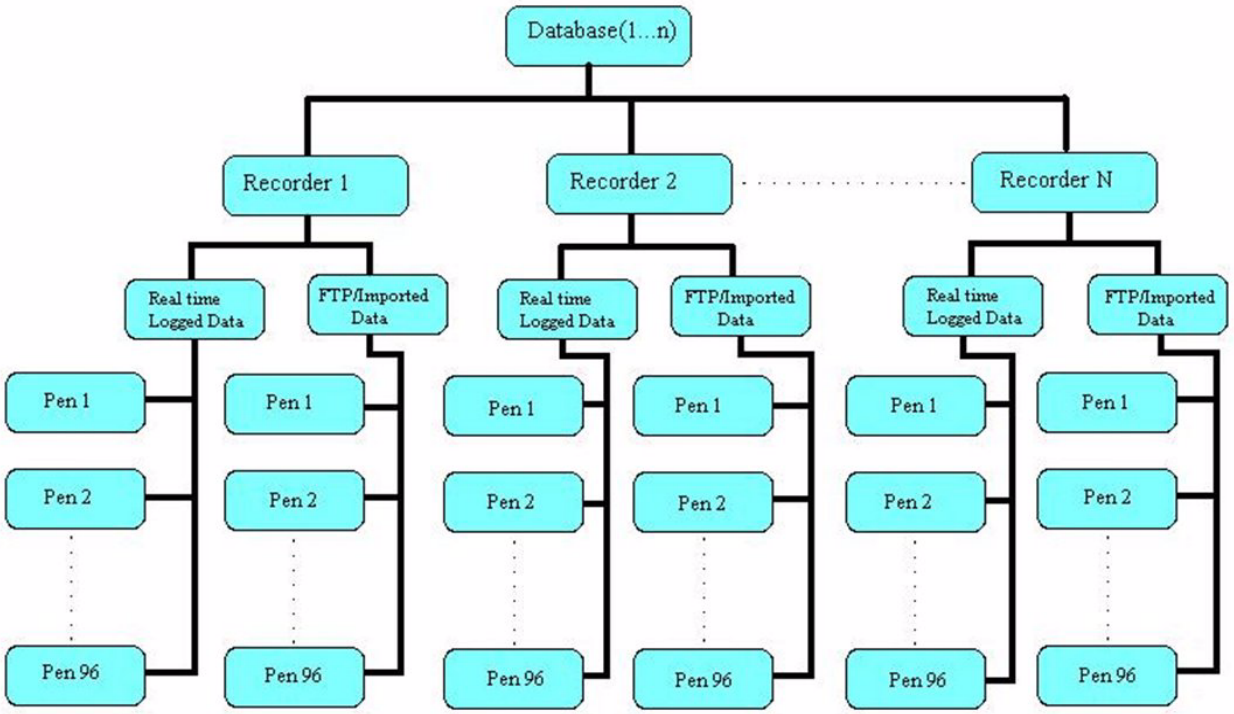


FIGURE 10.1 OPC Client application

Figure 10.2 shows how an OPC client may be interfaced to the **TrendView** Historian Server. This example uses an OPC HDA demo client from Matrikon, which is one of a number of OPC developers for the industrial and process markets. Their OPC demo software

can be downloaded for free at: https://www.matrikonopc.com/downloads/145/specifications/index.aspx

This example goes through the set up of the Matrikon OPC HDA Client and how to view historical data from the system where ***Trend Manager*** software is installed.

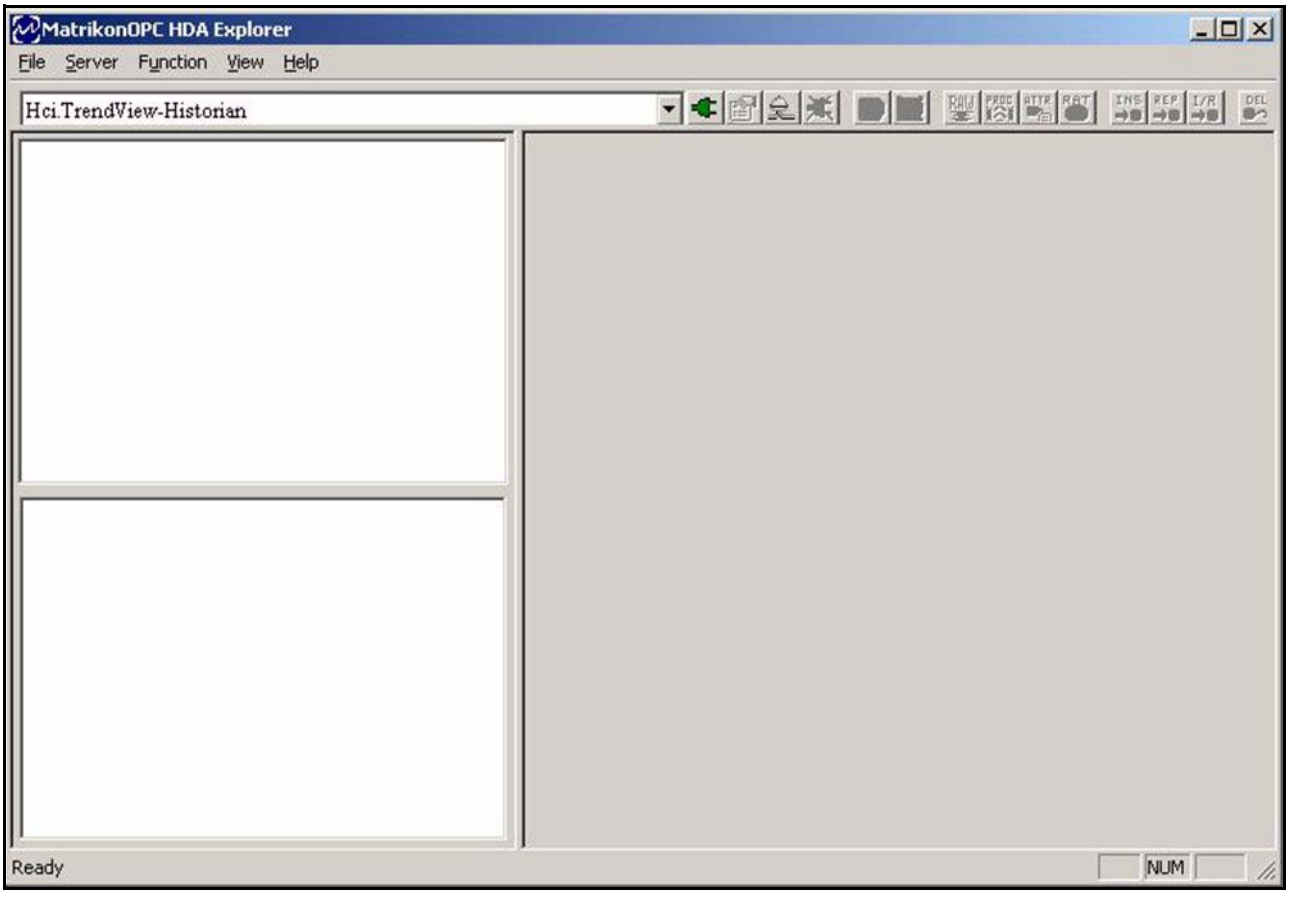
Retrieving Data from TrendView Historian Server

Steps to retrieve historical data

In Figure 10.2 , only synchronous functionality is explained since Matrikon only support Synchronous interfaces. For Asynchronous functionality, use any other OPC client e.g. OSI PI HDA client.

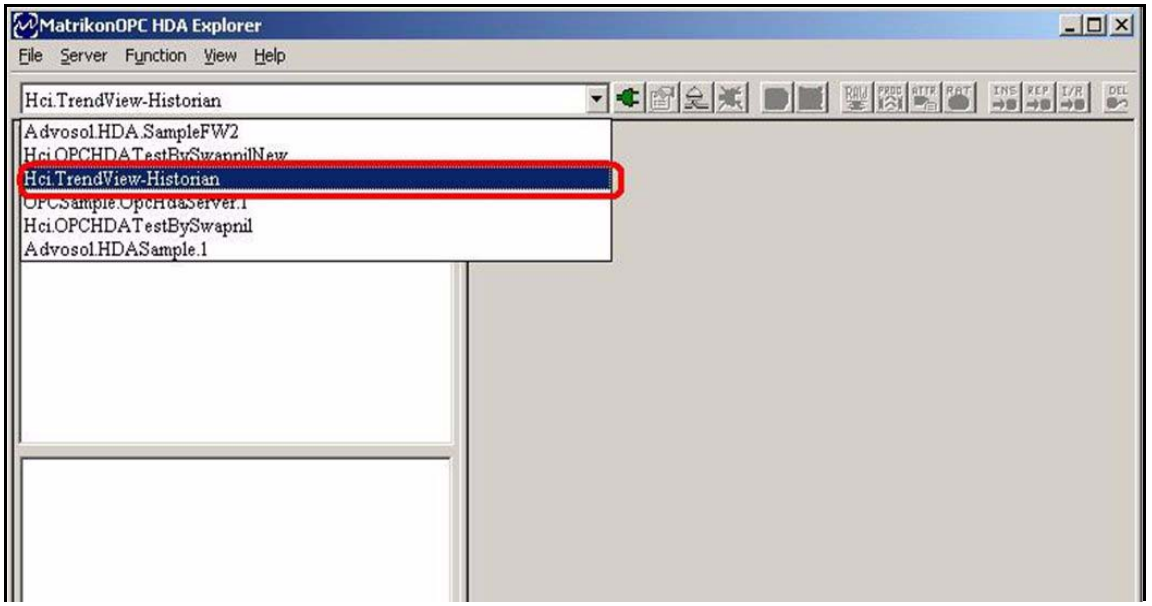
1. Start the Matrikon OPC HDA Explorer Client. Matrikon OPC HDA Explorer screen is shown below.

FIGURE 10.2 MatrikonOPC HDA Explorer Client Startup Screen



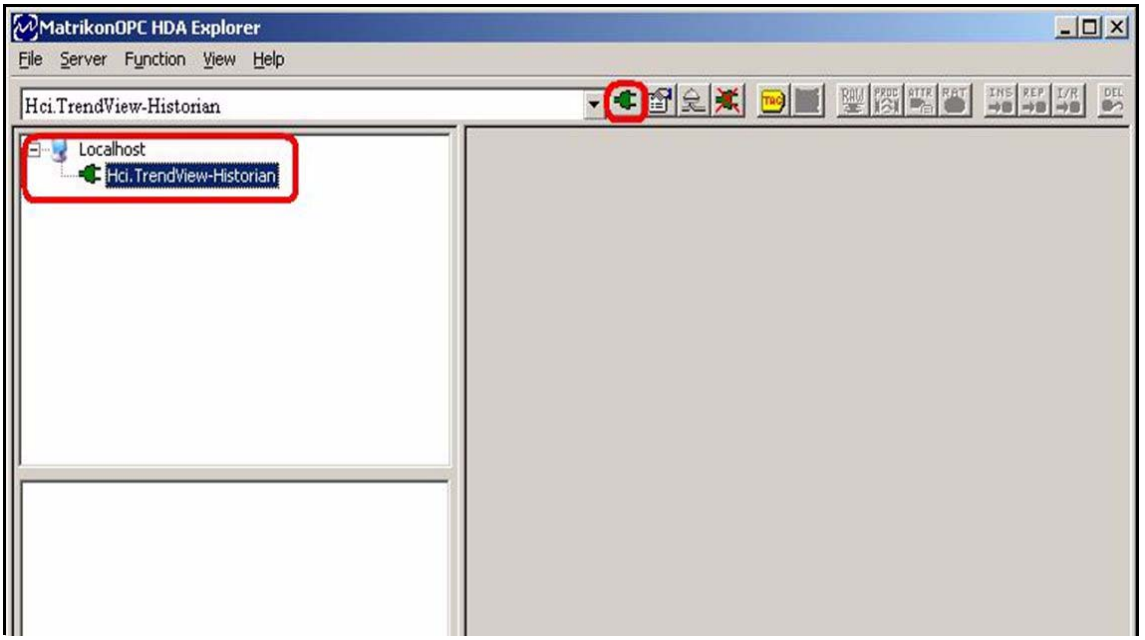
2. To Connect the **TrendView** Historian Server on the local system, click on the HDA Server list dropdown list and select **Hci.TrendView-Historian Server**. For connecting to the **TrendView** Historian on a Remote system go to Step 4.

FIGURE 10.3 Select Hci.TrendView-Historian Server from Server List



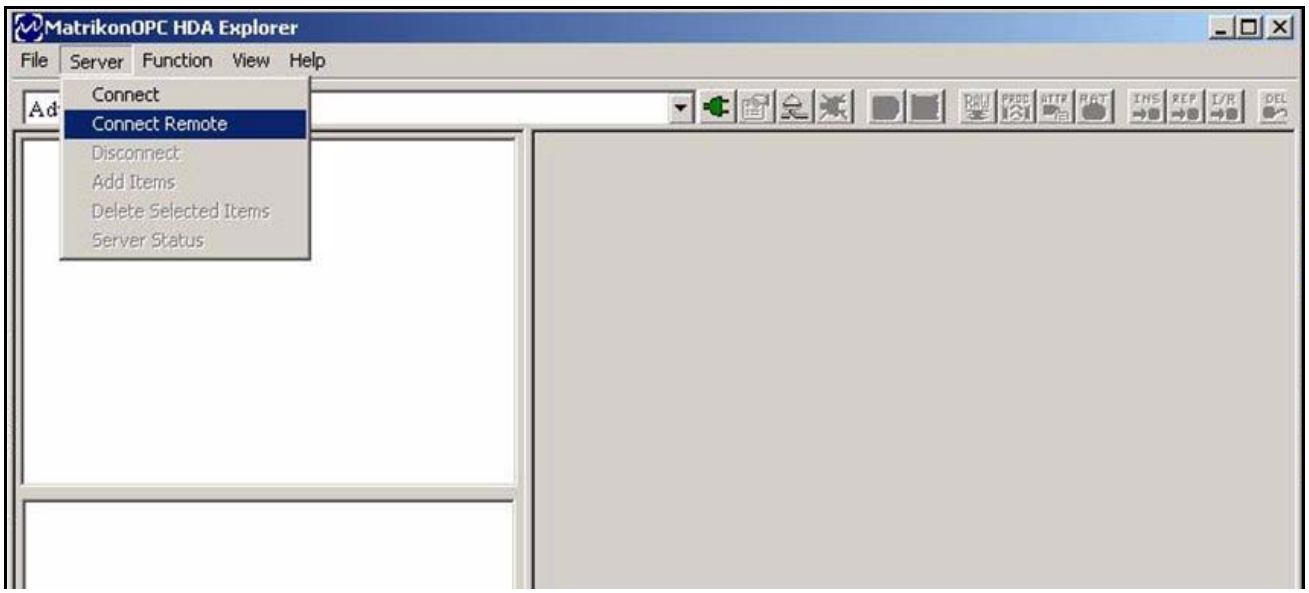
3. Click (Connect) button to connect to the **Hci.TrendView-Historian Server**. Also you can connect from the menu Server > Connect.. The **Hci.TrendView-Historian Server** will get added under **LocalHost**. Now Move to step 7.

FIGURE 10.4 Hci.TrendView-Historian gets added under LocalHost



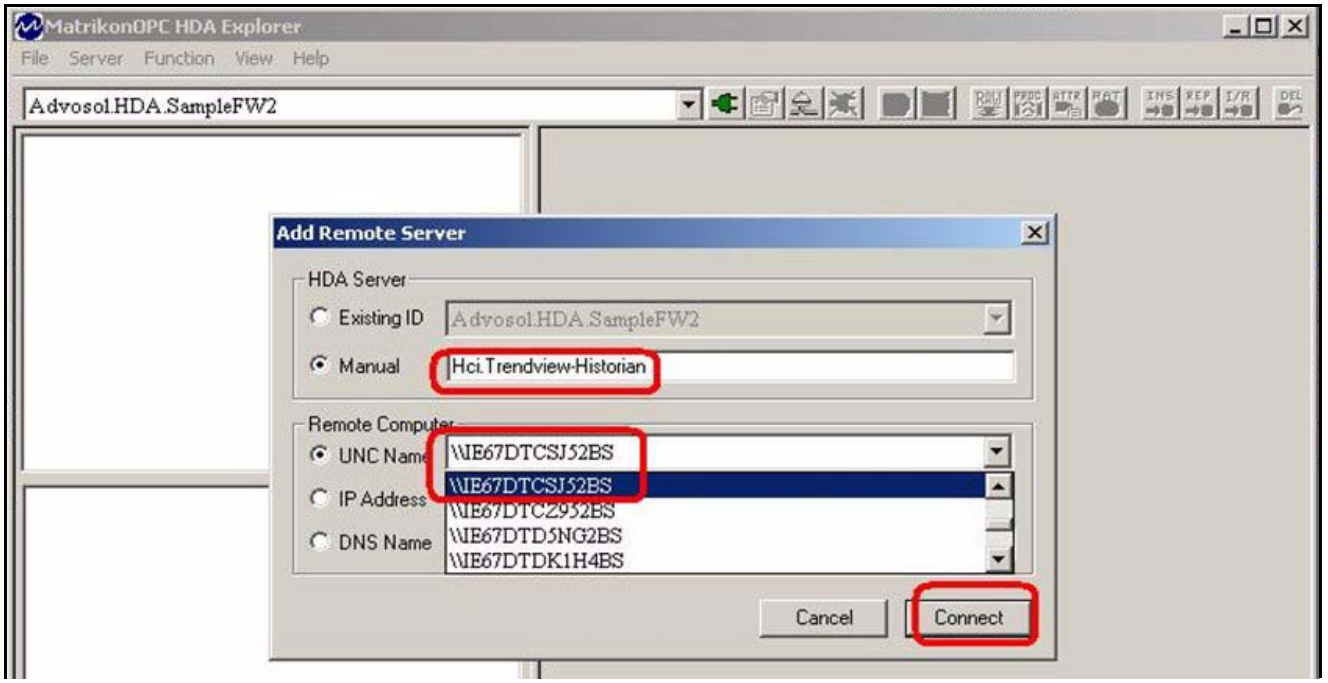
4. For connecting a remote **TrendView** Historian Server. Go to Server menu > **Connect Remote** or click (Connect Remote) button on screen. It will open "**Add Remote Server" Dialog**.

FIGURE 10.5 Connect Remote to connecting remote Server



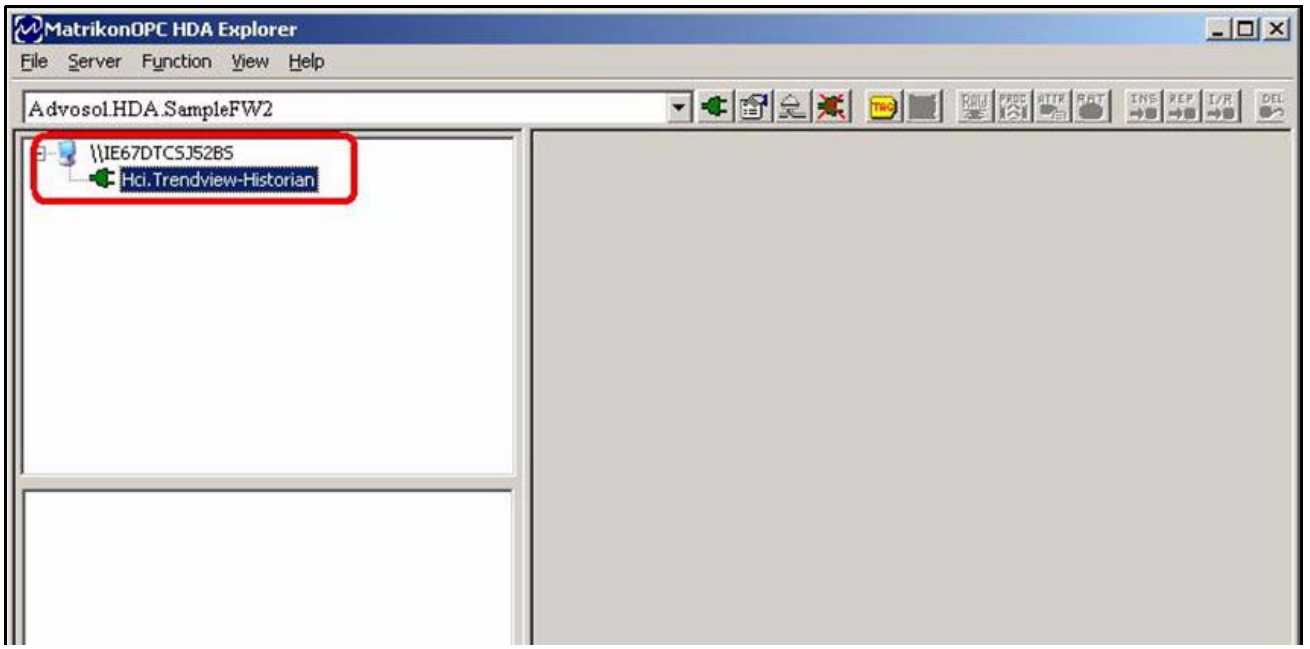
5. In **Add Remote Server Dialog**, Select "**Manual"** radio control for the HDA Server and enter "**Hci.TrendView-Historian**". Select **UNC Name** in Remote Computer and select the remote system name where OPC **TrendView** is installed. Click "**Connect"** to connect with Remote OPC **TrendView** Historian Server.

FIGURE 10.6 Add Remote Server Dialog.



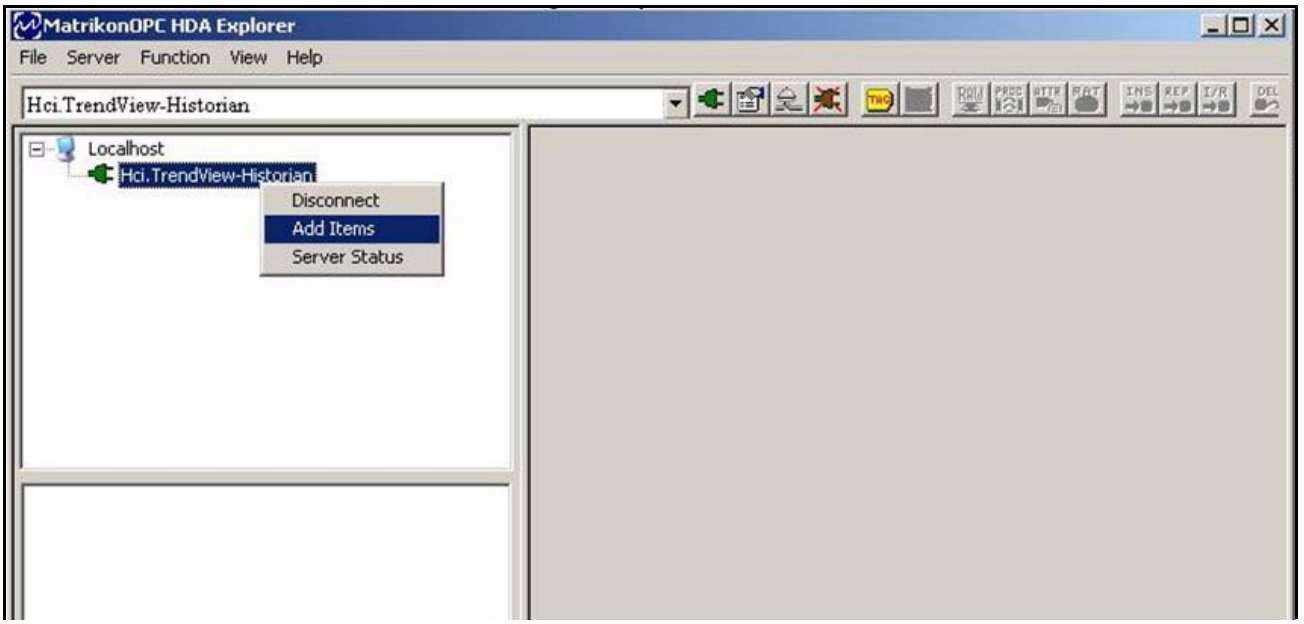
6. After clicking the "**Connect**" button in **Remote Server Dialog**, the dialog will close and "**HCi.TrendView-Historian**" will show under remote computer name.

FIGURE 10.7 OPC TrendView Historian server added under Remote system



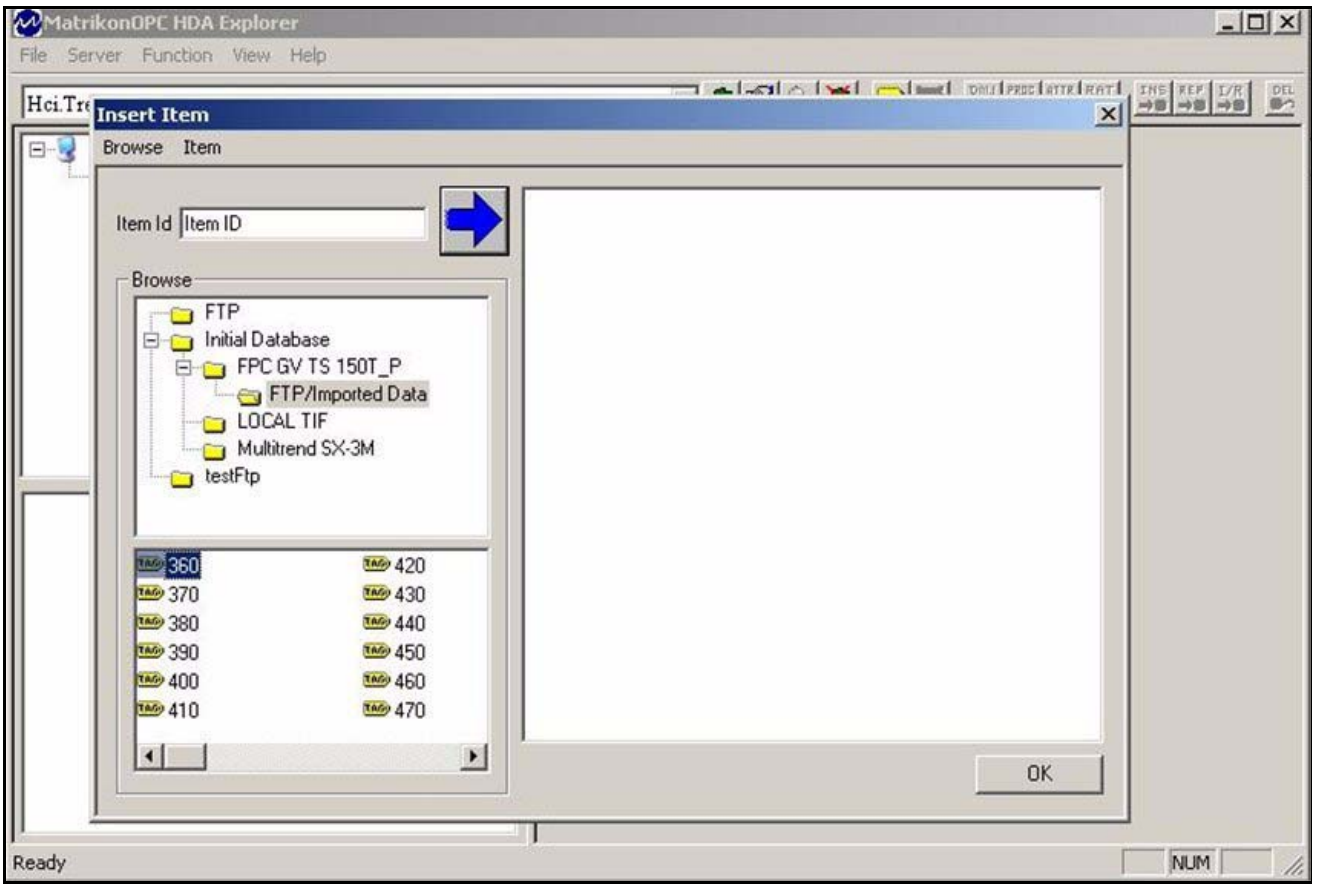
7. To **Add Item**, right click on "**HCi.Trendview-Historian** and click **Add Items**, or add by clicking on (Add Items) button on screen. "**Insert Item**" dialog will open.

FIGURE 10.8 Add Items dialog



8. Once the “**Insert Dialog**” is open, use the Browse window to navigae to the required Pen location. List of pens will show at lower left corner of dialog.

FIGURE 10.9 Insert Item Dialog. Browse tree to reach required Pen



NOTE: Historical data may come from multiple sources like Real time logging, FTP or be imported from USB, SD card or /GR1Compact flash devices. To distinguish them a new branch has been added into the tree. The details are given below.

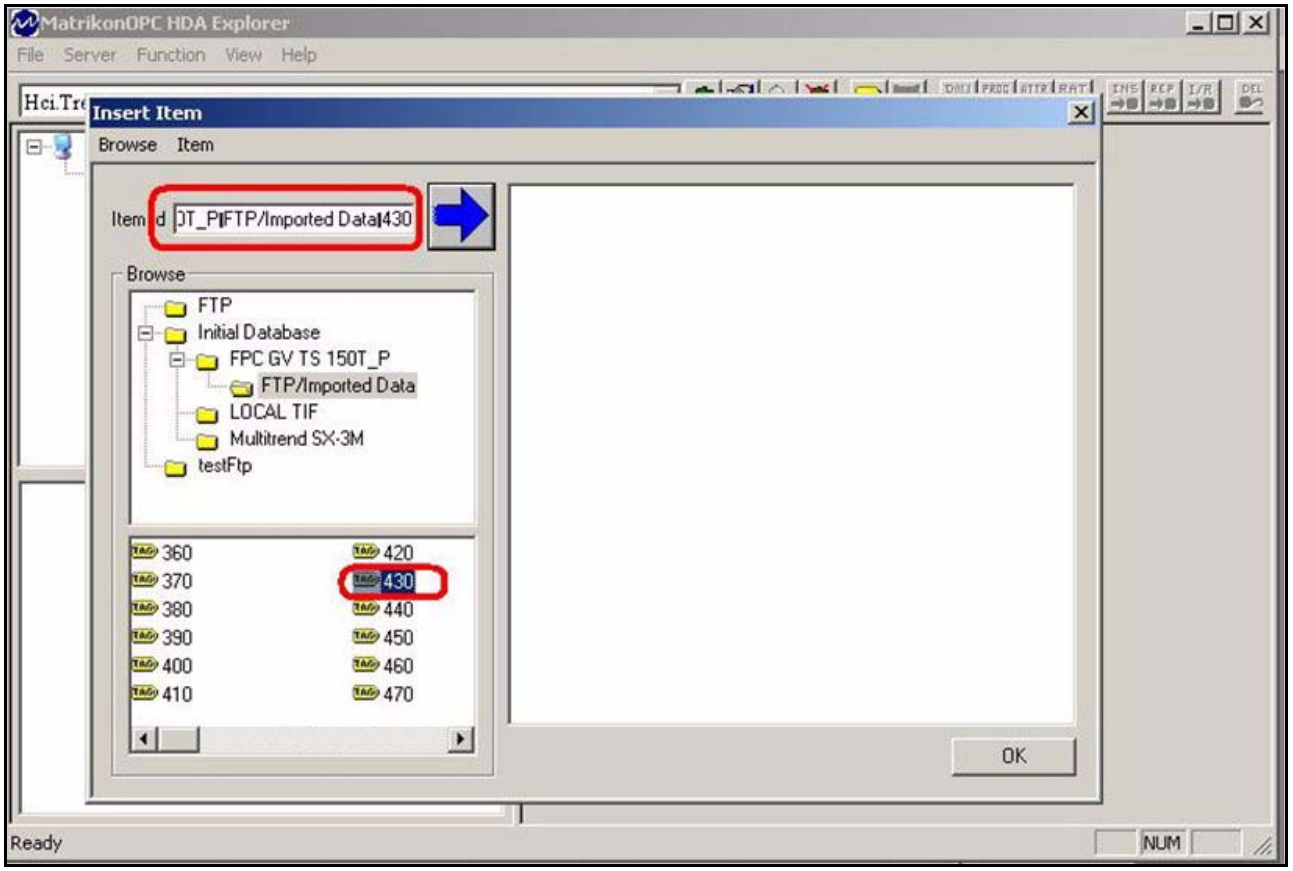
- **Real Time Logged Data:** Real time data logged by communication server in ***Trend Manager*** software. If you make changes to the time in the system where the communication server is logging real time data then Historian Data after the time change will be shown in **Real Time Logged Data** and Historian data before the time change will be shown in **Real Time Logged Data 1**, The number will keep increasing for each change in the time.

- **FTP/Imported Data:** Data imported from FTP using SD card, Compact Flash or USB Drive. If you make changes to the time in the recorder while logging data in the recorder then the Historian data after the time change will be shown in **FTP/Imported**

Data while historian data before the time change is shown in **FTP/Imported Data 1** branch.

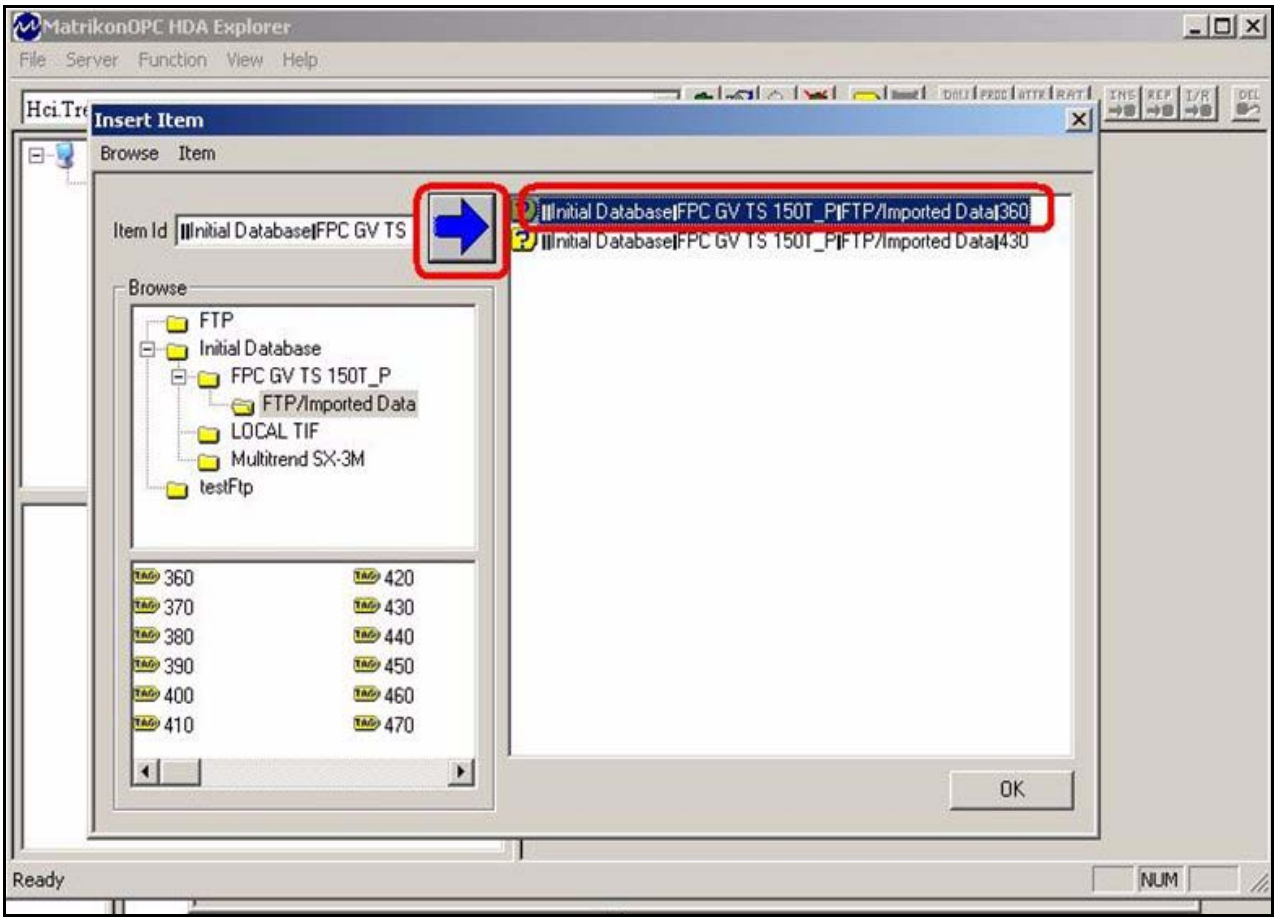
9. Double click on the pen with the historical data you want to retrieve. Double click on the pen ID and it will show in the **Item Id** edit box. Pen **430** has been selected in this example.

FIGURE 10.10 Select the pen for insertion



10. Click to enter the pen into the selected item list. Follow the same procedure for adding multiple pens. Click **OK** to close the dialog.

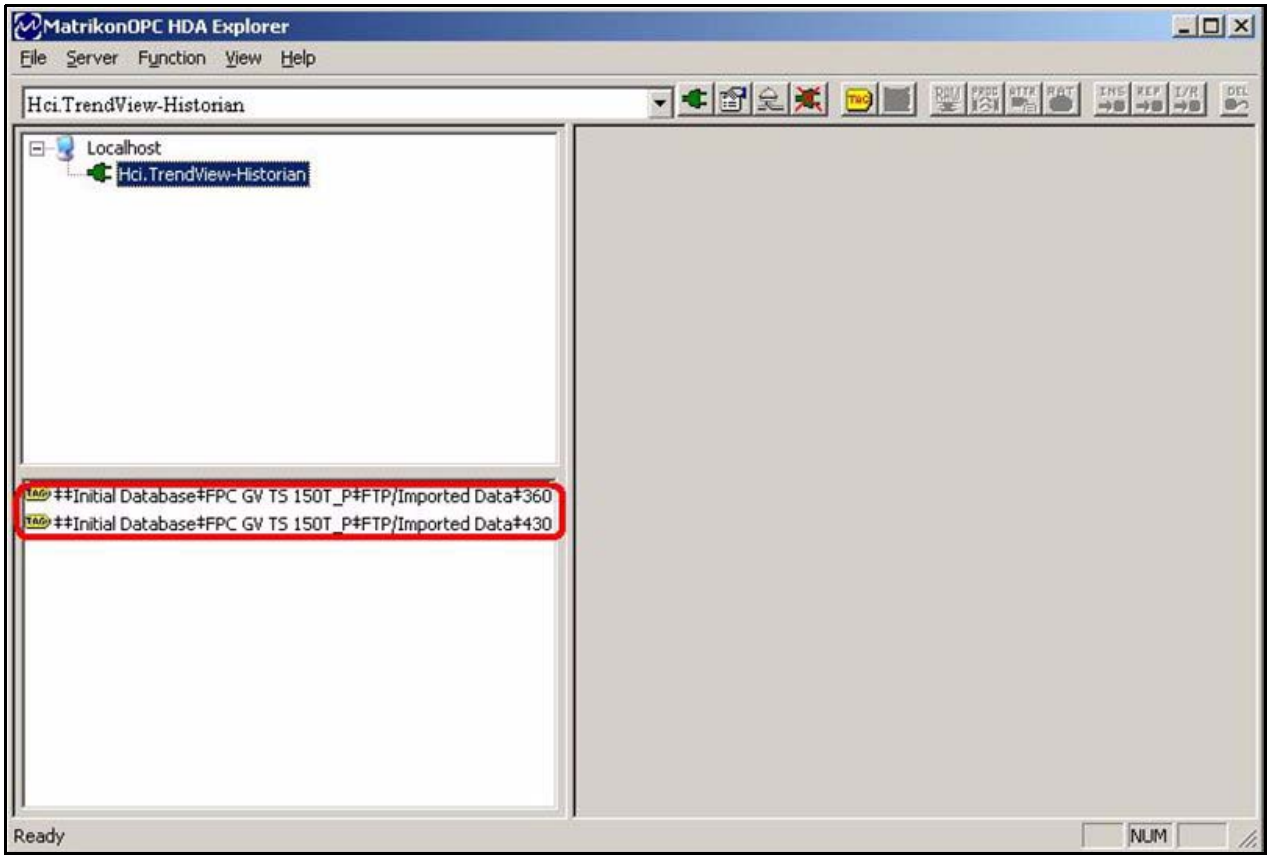
FIGURE 10.11 Insert Item Dialog



Select the pen with the historical data you want to retrieve.

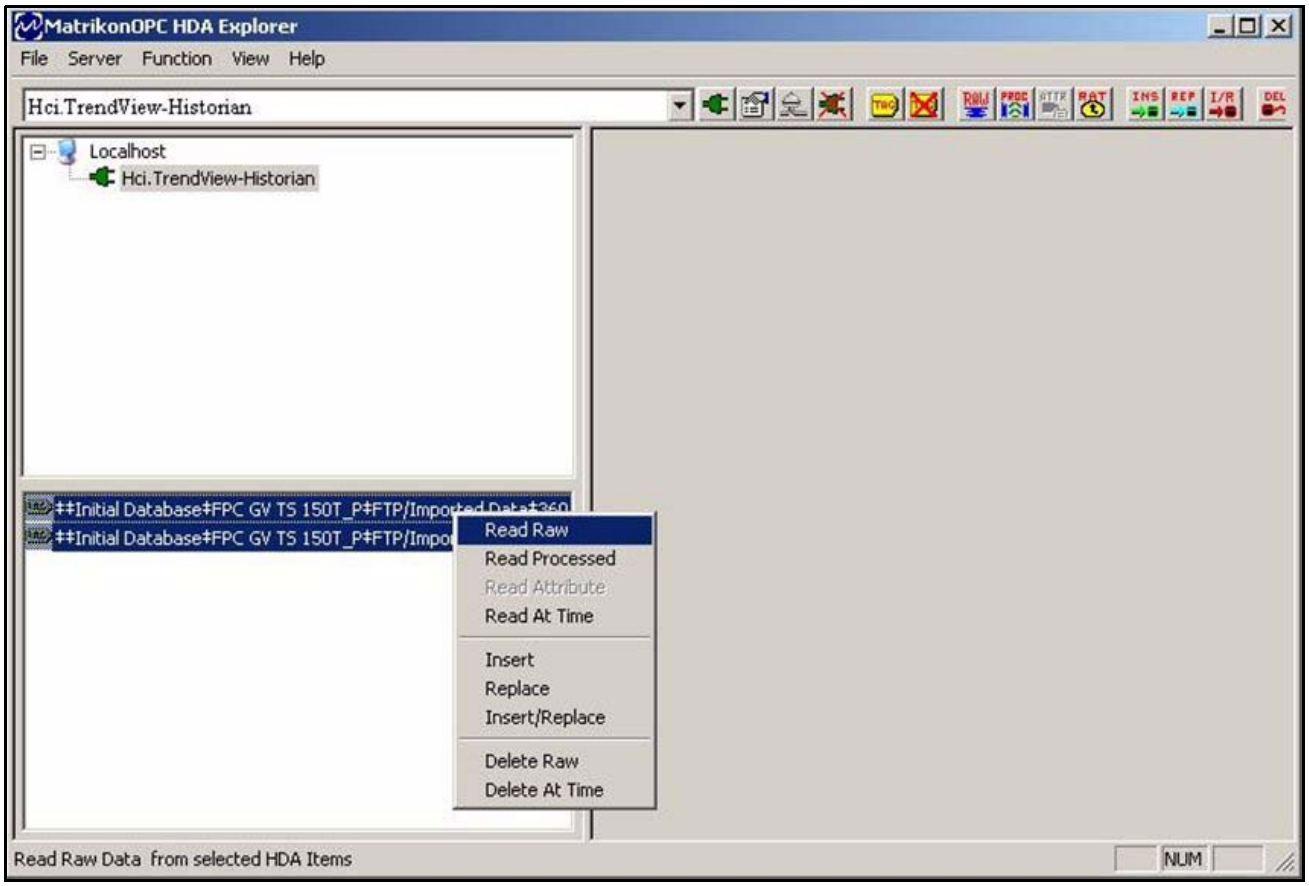
11. The selected pen will be shown in the list present at the lower left corner.

FIGURE 10.12 Selected pens shown



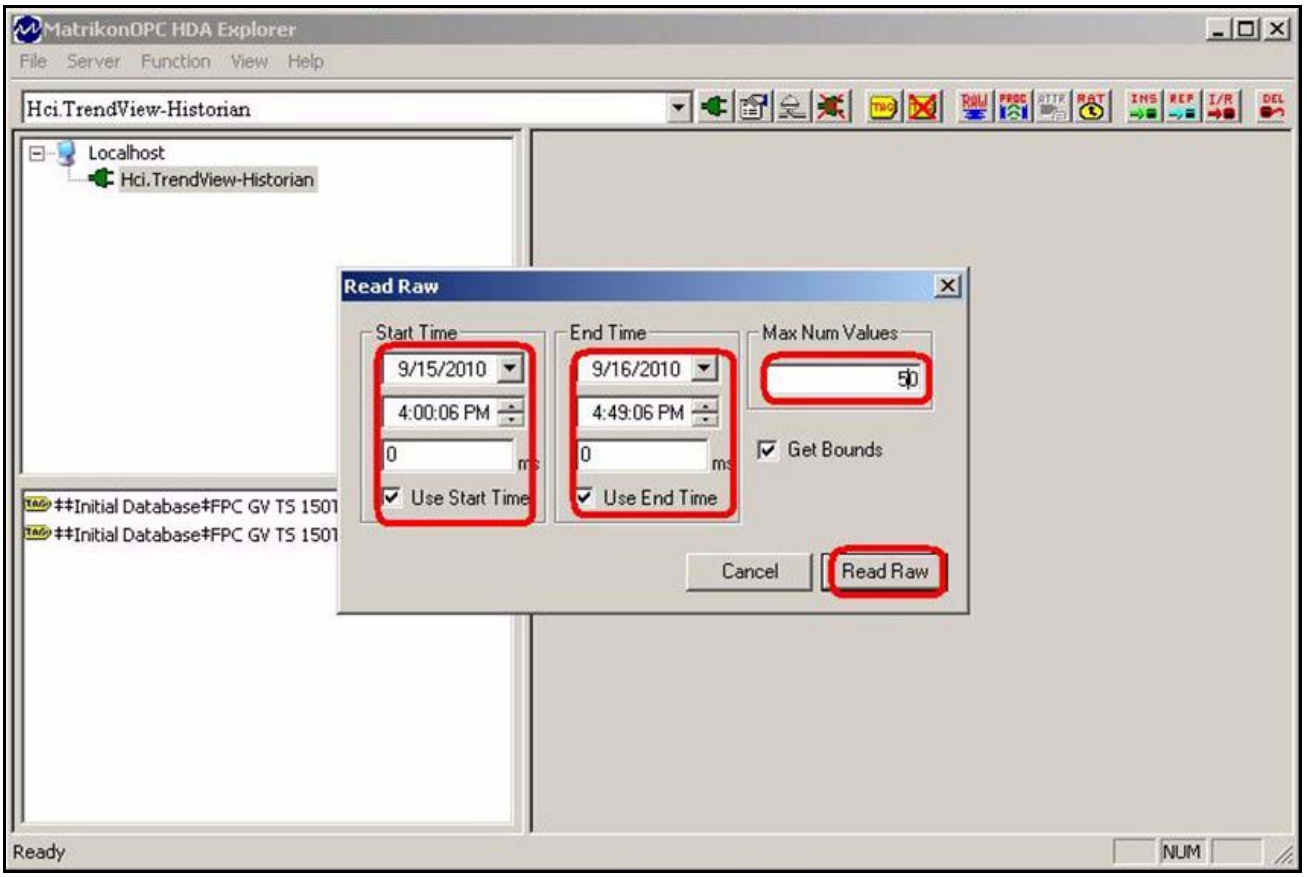
12. Right click on the pen to retrieve associated historical data associated. The context menu will be shown, click on **Read Raw.** It will open the**Read Raw Dialog**. Multiple pens can be selected for retrieving associated historical data.

FIGURE 10.13 Selecting Read Raw to retrieve historical data



13. Set the Start Time, End Time and Maximum Number of Values needed to be retrieved.
    If **Get Bound** option is checked the data between Start Time and End time will be retrieved including start and end time boundaries. If not, it will just retrieve the data excluding start and end time boundaries. **Max Num Value** option is the maximum number of Historical data points that can be obtained from server. Clicking on **Read Raw** option will retrieve the historical data for the specified time.

FIGURE 10.14 ReadRaw Data



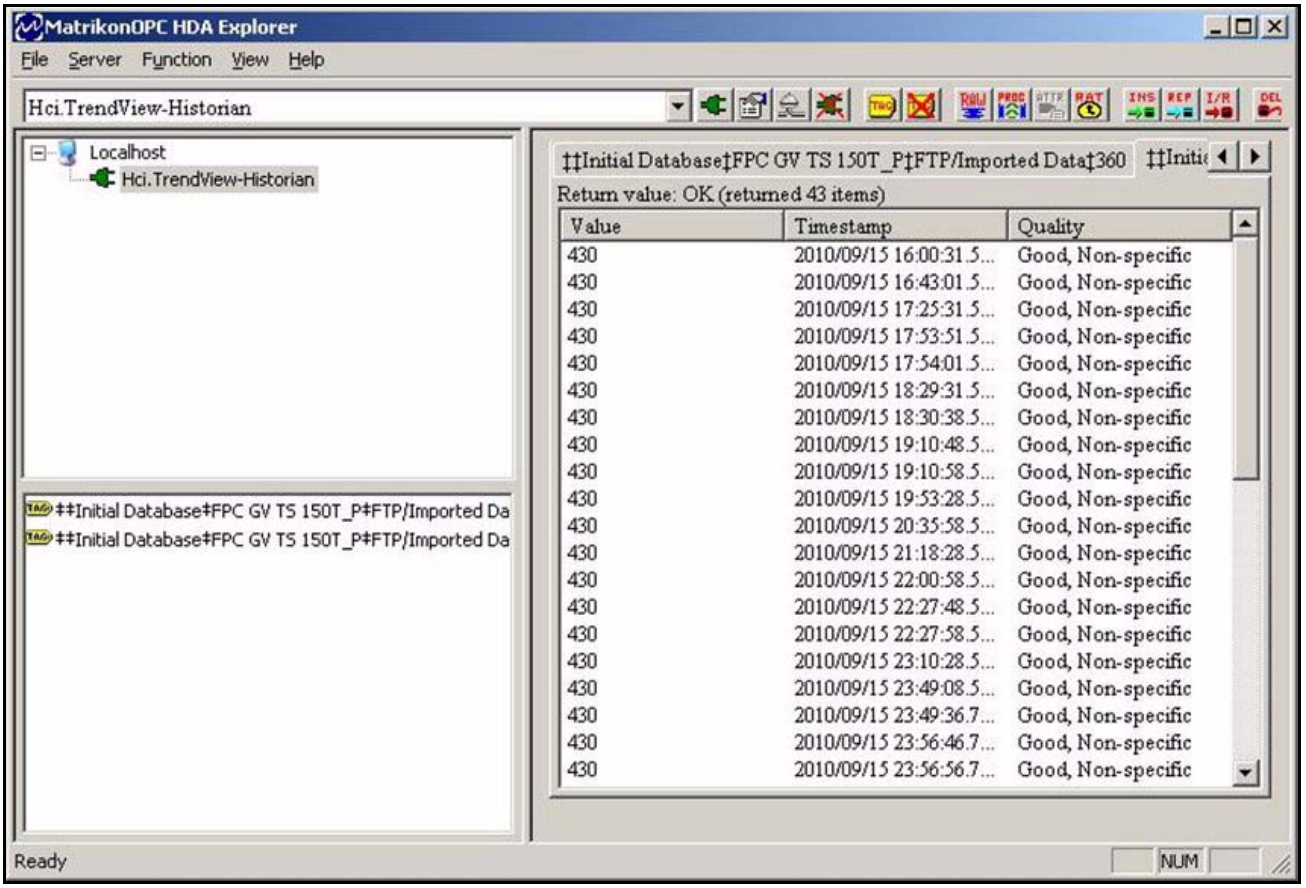
Note: If you specify 0 as **Max Num Values** then the maximum number of historical data specified will returned. If the time span contains lesser values then the maximum number of historical data specified, then all the Historical data in the time span will be returned. To view the maximum number Historical data that can be returned by the server, see *"Get Server Status" on page 249*.

Note: The server returns the data with a timestamp of the recorder i.e. local timestamp.

Some OPC HDA client considers timestamp as GMT converted into local timestamp which may cause it to return invalid historical data. It is suggested that you should add or subtract the time difference to the start time and end time timestamp while viewing historical data.

14. Clicking **Read Raw** will close the **Read Raw Dialog**. All the values will show in the right hand side list box. The number of Historical data values returned is shown above the list box. You can view the associated historical data with another pen by selecting the tab associated to it.

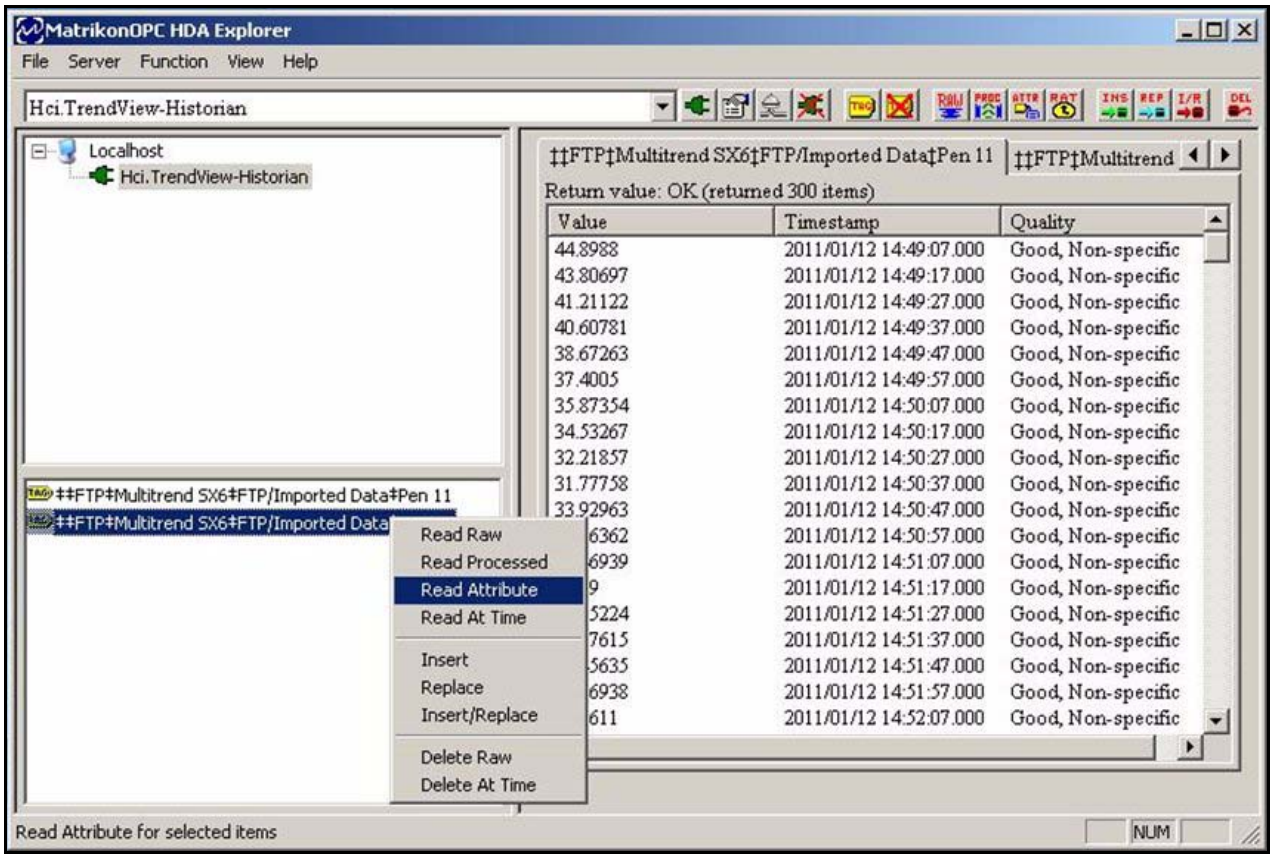
FIGURE 10.15 Showing Historical Data Associated with Pen


MatrikonOPC HDA Explorer
File Server Function View Help
Hci.TrendView-Historian
Localhost
Hci.TrendView-Historian
‡‡Initial Database‡FPC GV TS 150T_P‡FTP/Imported Da
‡‡Initial Database‡FPC GV TS 150T_P‡FTP/Imported Da
‡‡Initial Database‡FPC GV TS 150T_P‡FTP/Imported Data‡360
Return value: OK (returned 43 items)
Value
Timestamp
Quality
430 2010/09/15 16:00:31.5... Good, Non-specific
430 2010/09/15 16:43:01.5... Good, Non-specific
430 2010/09/15 17:25:31.5... Good, Non-specific
430 2010/09/15 17:53:51.5... Good, Non-specific
430 2010/09/15 17:54:01.5... Good, Non-specific
430 2010/09/15 18:29:31.5... Good, Non-specific
430 2010/09/15 18:30:38.5... Good, Non-specific
430 2010/09/15 19:10:48.5... Good, Non-specific
430 2010/09/15 19:10:58.5... Good, Non-specific
430 2010/09/15 19:53:28.5... Good, Non-specific
430 2010/09/15 20:35:58.5... Good, Non-specific
430 2010/09/15 21:18:28.5... Good, Non-specific
430 2010/09/15 22:00:58.5... Good, Non-specific
430 2010/09/15 22:27:48.5... Good, Non-specific
430 2010/09/15 22:27:58.5... Good, Non-specific
430 2010/09/15 23:10:28.5... Good, Non-specific
430 2010/09/15 23:49:08.5... Good, Non-specific
430 2010/09/15 23:49:36.7... Good, Non-specific
430 2010/09/15 23:56:46.7... Good, Non-specific
430 2010/09/15 23:56:56.7... Good, Non-specific
Ready
NUM

Steps to read attribute.

1. Please follow the first 11 steps given in Retrieve Historical data to add items/Pens.
2. Right click on the pen name and select **Read Attribute**. It will open **Read Attribute Dialog.**

FIGURE 10.16 Selecting Read Attribute

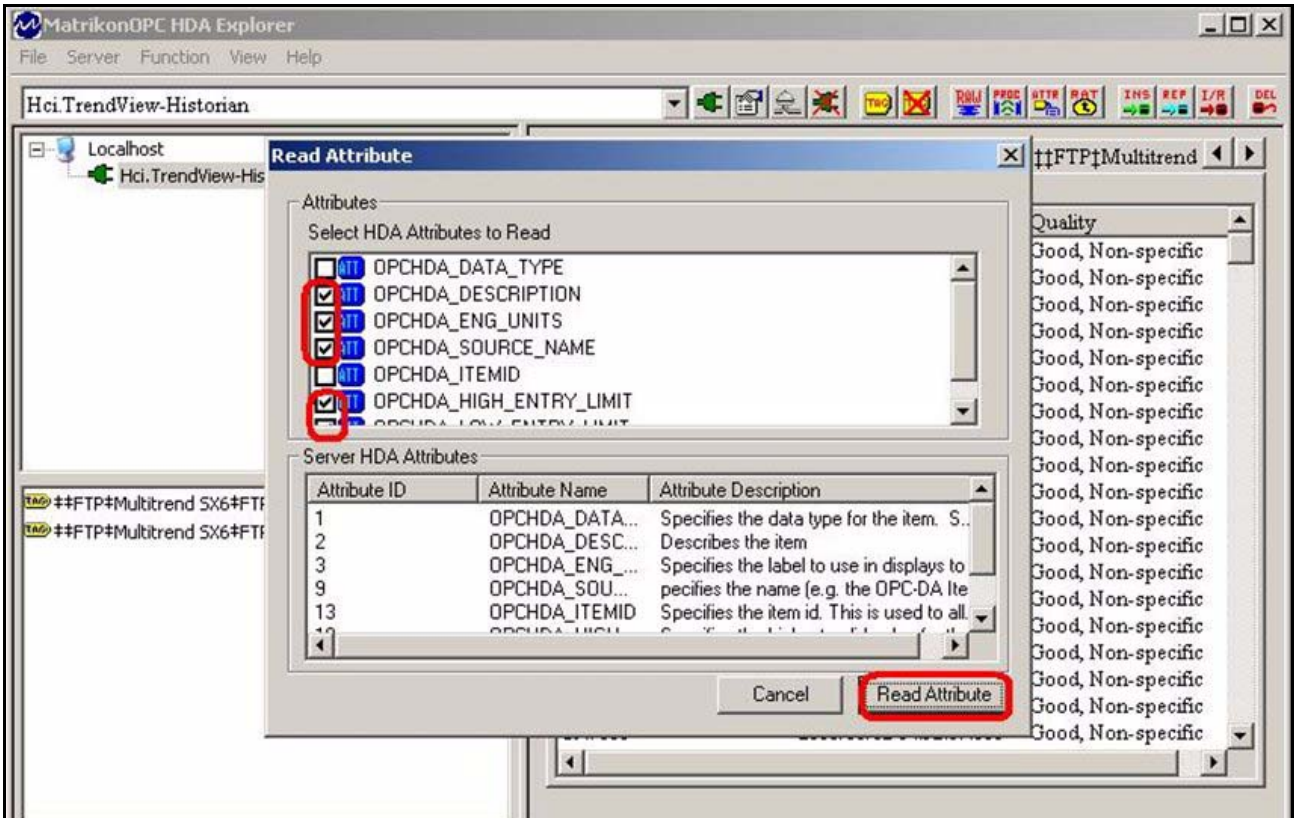


3. Select the Checkbox in front of the attribute for retrieving the associated information for the pen. Attributes are used to return information associated with the pen. Click **Read Attribute** to retrieve the information associated with the pen.

NOTE: Support is provided for below Attributes only:

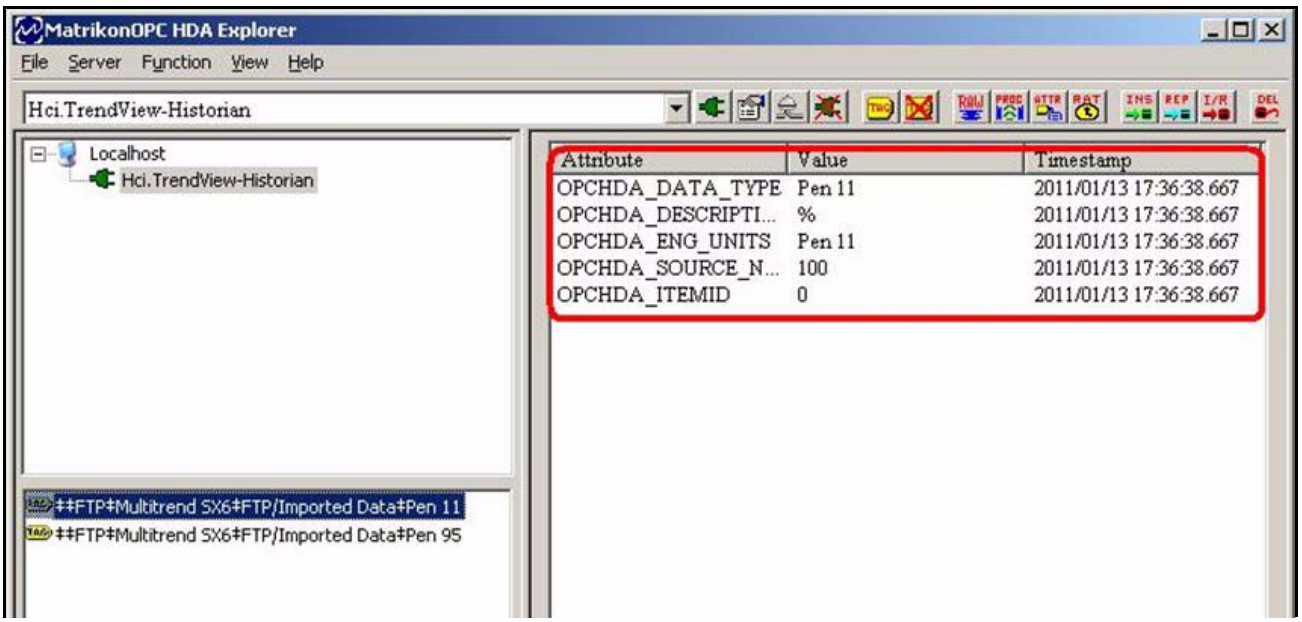
- •**OPCHDA_ITEMID**: ItemID - Specifies the item id.
- •**OPCHDA_DESCRIPTION:** Description - Describes the item
- •**OPCHDA_ENG_UNITS:** Eng Units - Specifies the label to use in displays to define the units for the item (e.g., kg/sec).
- •**OPCHDA_SOURCE_NAME:** Source Name - Specifies the name of the item on the source.
- •**OPCHDA_HIGH_ENTRY_LIMIT:** High Entry Limit - Specifies the highest valid value for the item. A value for the item that is above OPCHDA_HIGH_ENTRY_LIMIT cannot be entered into history. This is the top of the span.
- •**OPCHDA_LOW_ENTRY_LIMIT:** Low Entry Limit - Specifies the lowest valid value for the item. A value for the item that is below OPCHDA_LOW_ENTRY_LIMIT cannot be entered into history. This is the zero for the span.

FIGURE 10.17 Read Attribute Select



4. Click the **Read Attribute** button to close **Read Attribute Dialog**. All the information will be shown in the right side view.

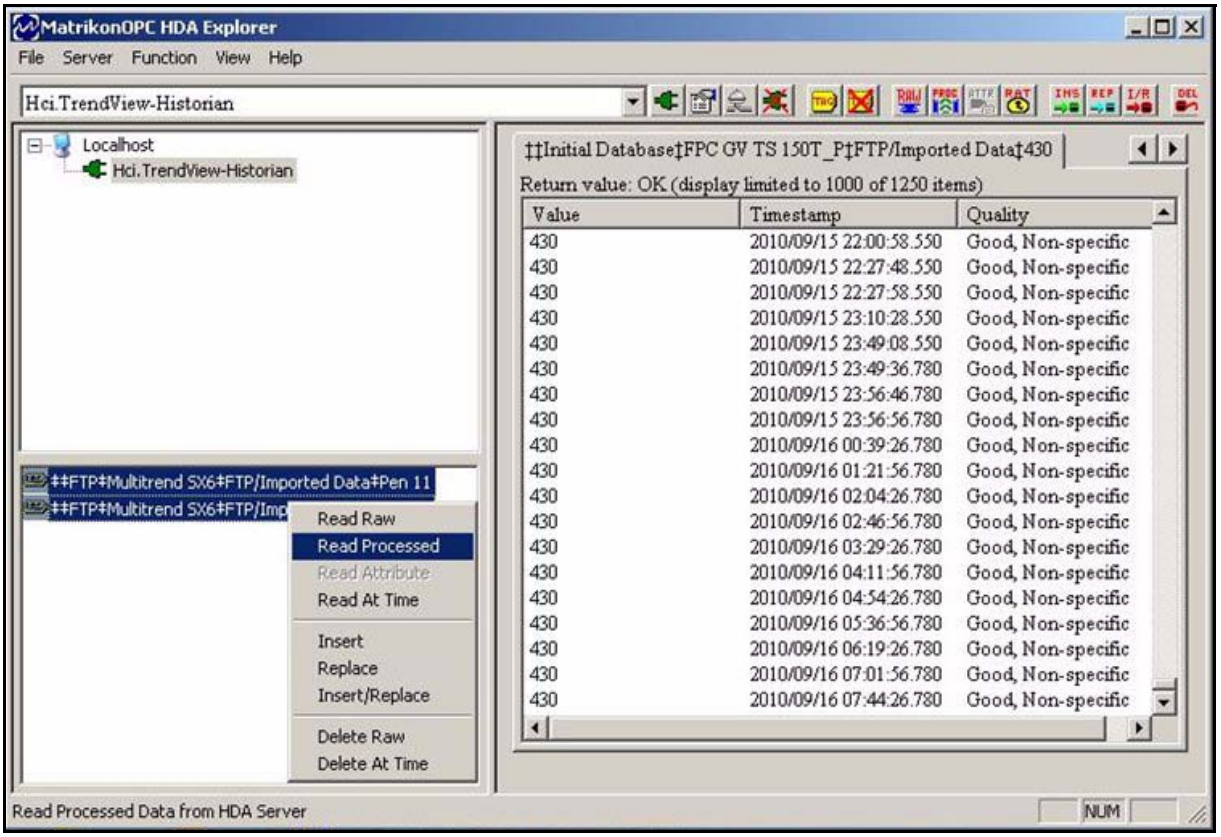
FIGURE 10.18 Read Attribute Dialog



Retrieving Aggregate values.

1. Please follow the first 11 steps given in Retrieve Historical data to add items/Pens.
2. Right click on the pen and select **Read Processed**. It will open **Read Processed Dialog**.

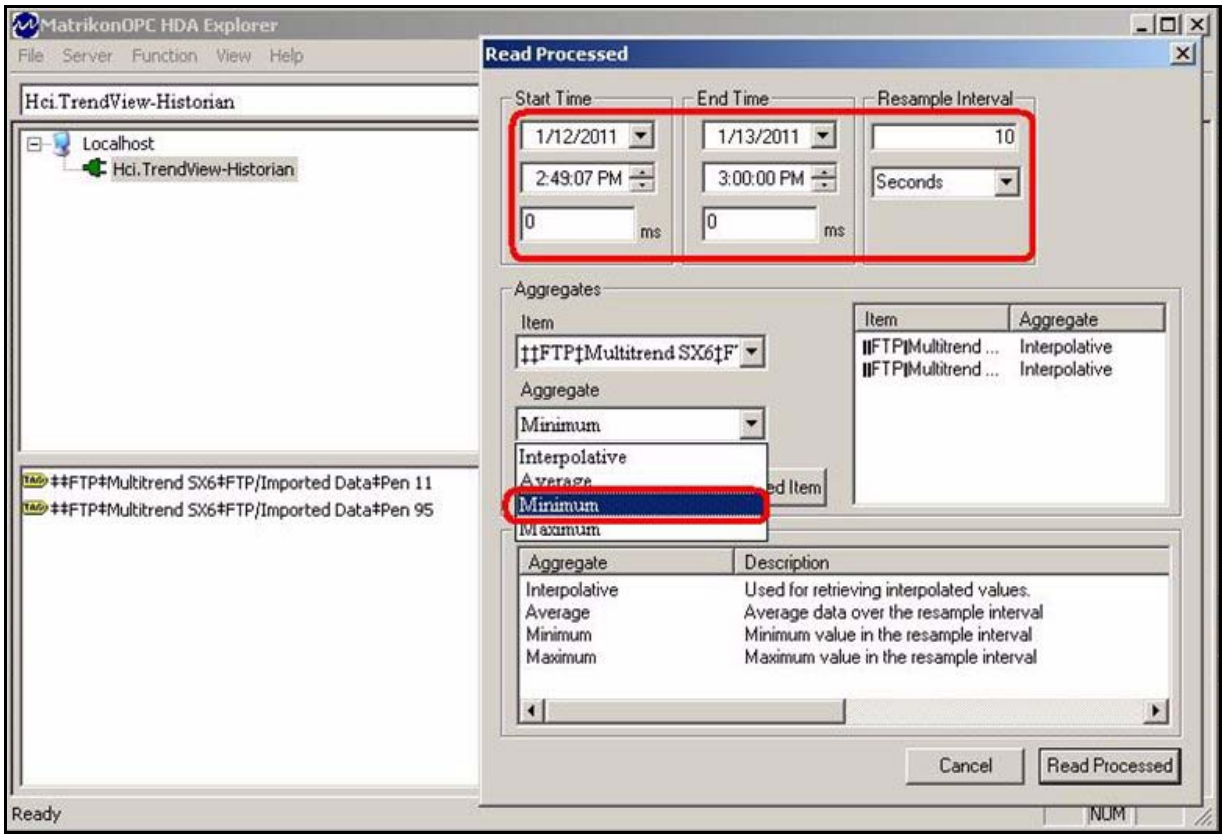
FIGURE 10.19 Read Processed Dialog



3. Set the Start Time, End Time and Resample interval. The Resample interval is the period during which you want to calculate the aggregate.

For more information please refer to **OPC HDA 1.20 Specification** by following this link http://www.opcfoundation.org/DownloadFile.aspx?RI=117

FIGURE 10.20 Set Start Time and End Time for Read Processed

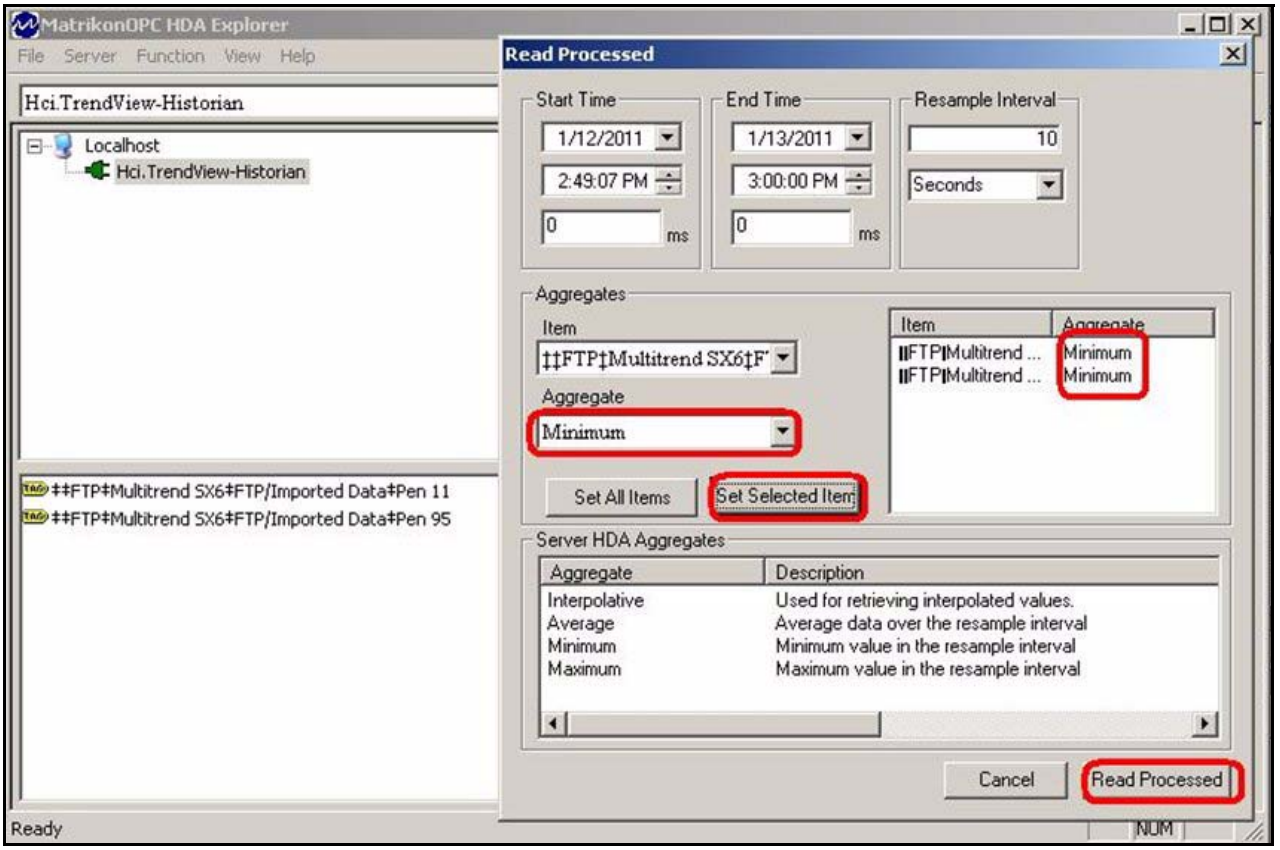


4. Select the **Pen** from the Aggregate Item box for the aggregate values required. Select Aggregate from Aggregate box. Click the **Set Selected Item** to add a pen with Aggregate. The pen name and Aggregate will display in the list control in Aggregate. Click the **Read Processed** button.

NOTE: Support is provided for below aggregates only:

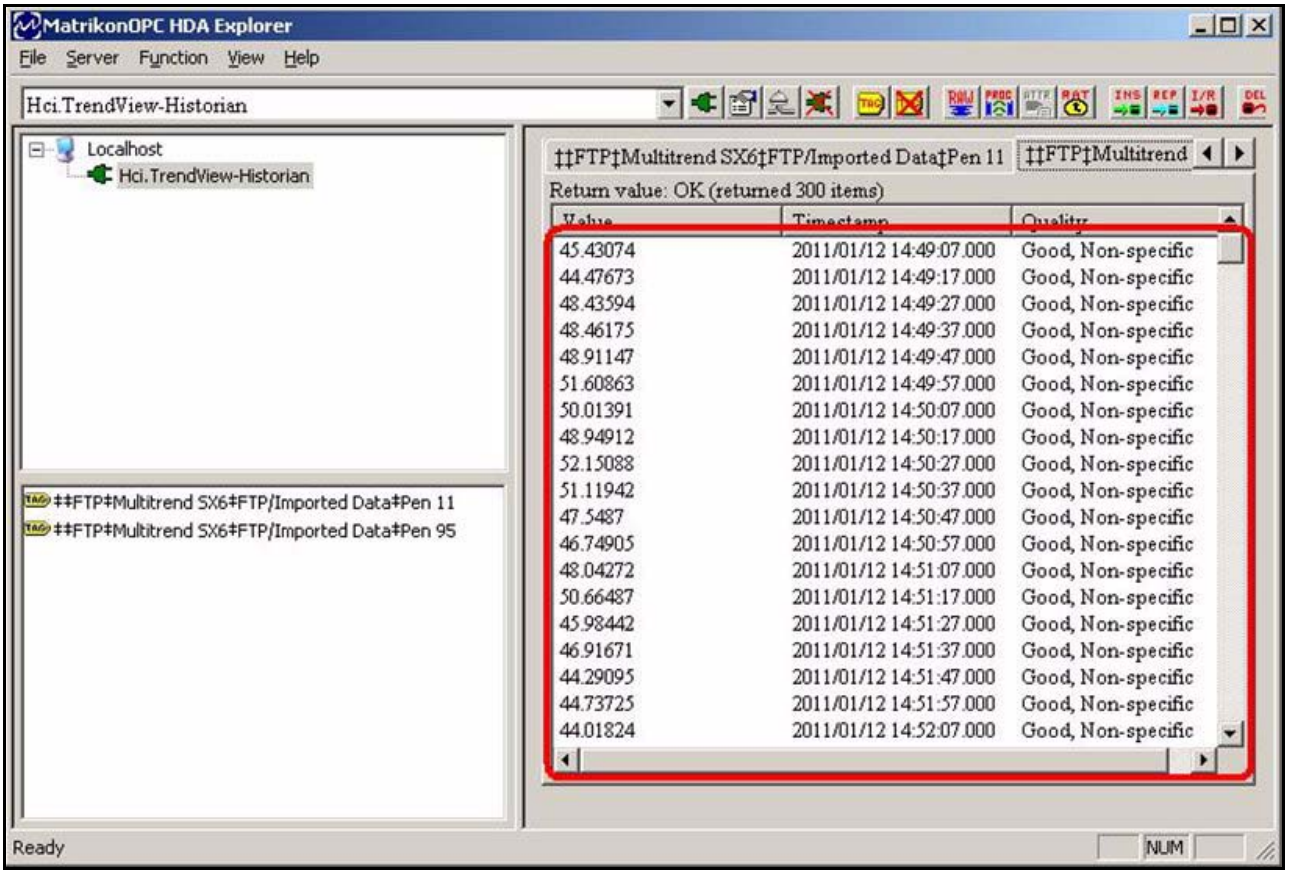
- •**AVERAGE:** The average aggregate adds up the values of all good raw data in a given interval, and divides the sum by the number of good values.
- •**MAXIMUM:** The Maximum aggregate retrieves the maximum good raw value within the interval and returns timestamp which will always be the start of the interval for every interval.
- •**MINIMUM:** The Minimum aggregate retrieves the minimum good raw value within the interval and returns timestamp which will always be the start of the interval for every interval.
- •**INTERPOLATIVE:** The Interpolative retrieves the data which is derived from the data in the database, but for which there is no stored value. This may be linearly derived from two stored data points on either side of the requested timestamp, or it may be extrapolated from the data in the archive.

FIGURE 10.21 Selecting Aggregate and respective pen



5. Clicking **Read Processed** will close the **Read Processed Dialog**. All the aggregate values are displayed in right side view as shown below.

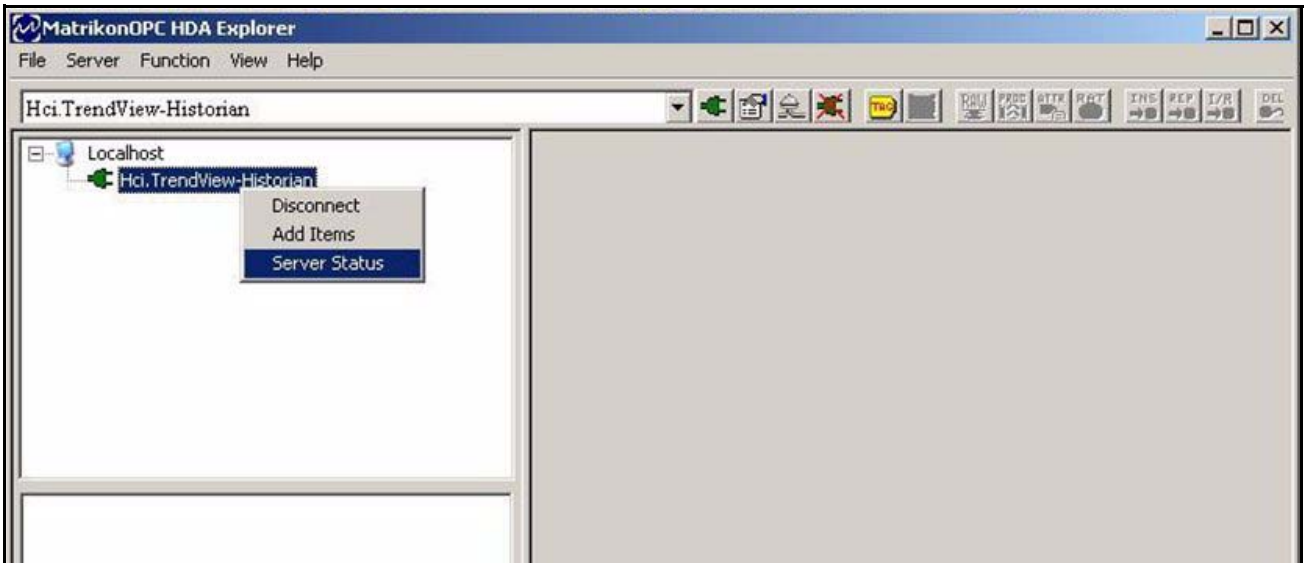
FIGURE 10.22 Aggregate Values



Get Server Status

1. Follow the steps below to retrieve the Server status.
2. Connect to the OPC **TrendView** Historian server.
3. Right click on **Hci.TrendView-Historian** Server, **Select Server Status** and the **Server Status Dialog** will open.

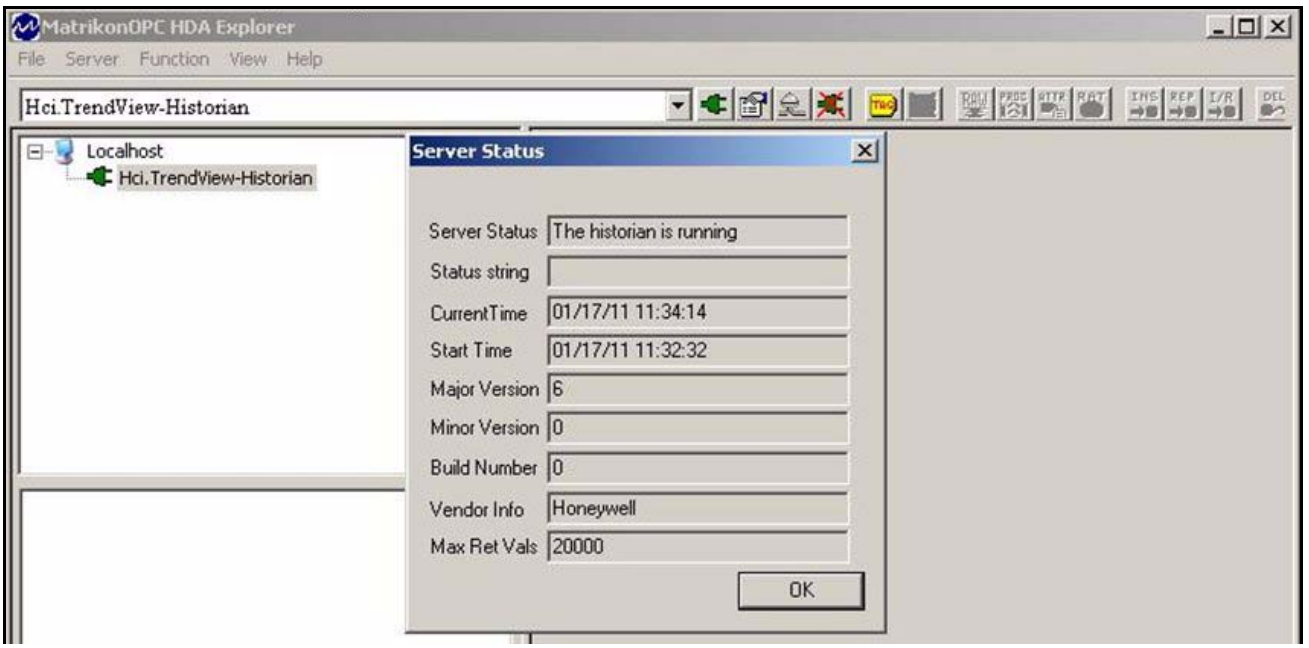
FIGURE 10.23 Select Server Status



Right click on **Hci.TrendView-Historian** to get the **Server Status Dialog**.

4. Server Status dialog will open.

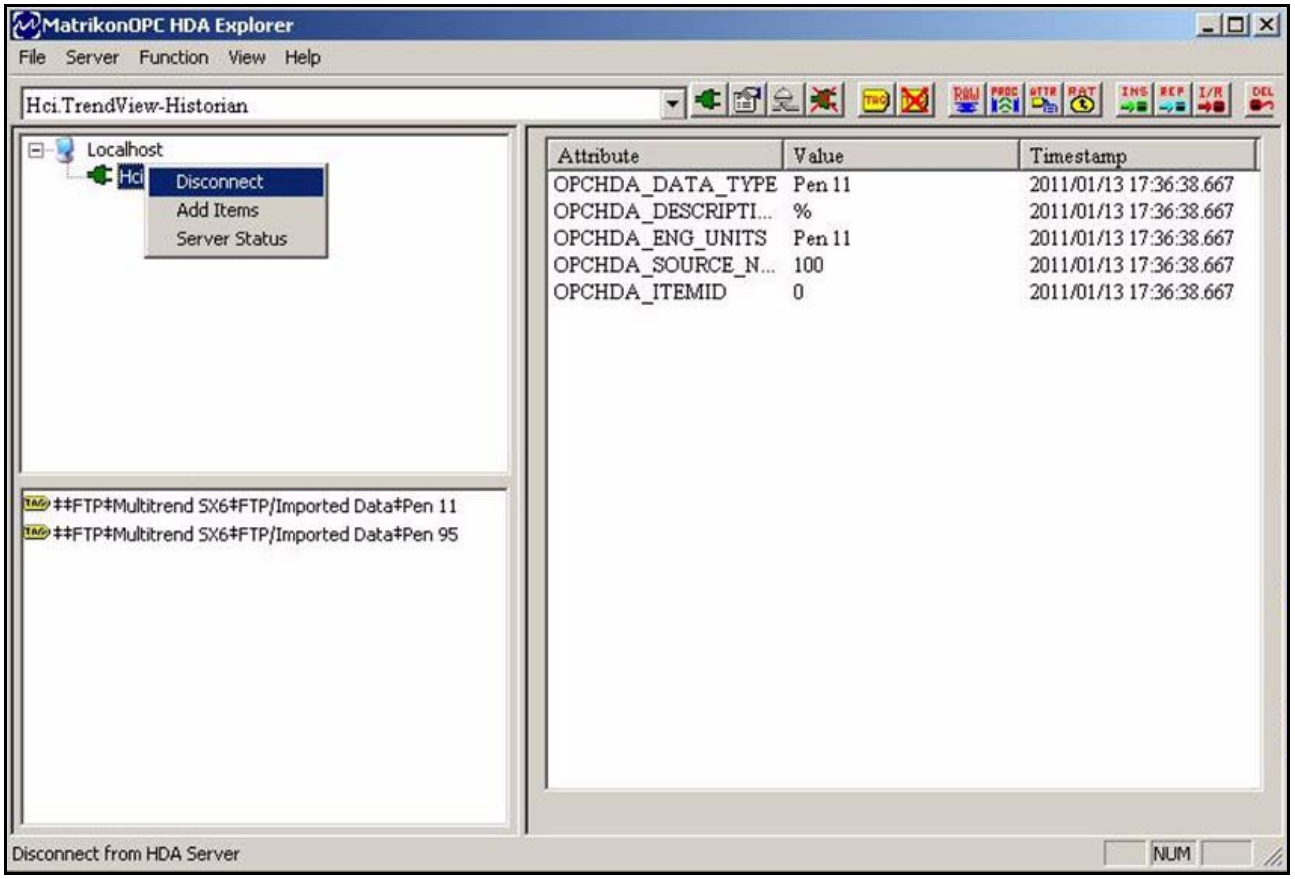
FIGURE 10.24 Server Status Dialog



Disconnecting Server

1. Right click on **Hci.Trendview-Historian** and Click **Disconnect** or click (Disconnect) to disconnect from server.

FIGURE 10.25 Select Disconnect Server



Constraints:

- In Hci.**TrendView**-Historian Server, insert and replace data functionality is not supported. You will not able to modify historical data in **TrendView**-historical server.
- In Hci.**TrendView**-Historian Server, Read Modified and Read at Time functionality of any data is not supported.

Chapter 11: Glossary

Explanation of terms relating to the *Trend Analysis Software.*

10baseT - Network cable and connections. Twisted pair cable, the most commonly used for Ethernet networks. The 10 means, 10 Mbps refers to the transmission speed.

10/100 - Either 10 base or 100 base (100mbps)

Address Resolution Protocol (ARP) - Used for mapping an IP Address to a physical machine address that is recognised in a local network, such as an Ethernet Address.

AMS2750 - is the specification that covers pyrometric requirements for thermal processing equipment used for heat treatment.

ASCII - American Standard Code for Information Interchange. Represents characters as numbers for data transfer between computers.

Barcode - A machine readable, graphic image using pre-defined patterns of linear bars or polygonal elements to encode, typically all of ASCII character codes.

Batch Mode - Management of sections of data. Batch markers are setup by the user and are used to identify and analyse batches of data.

Baud rate - Number of signalling elements that occur each second (bps).

BOOTP - Bootstrap Protocol is an Internet Protocol which allows a diskless workstation to discover its own Internet Address, the IP address of a BOOTP server on the network, and a file to be loaded into memory to boot the machine. This enables a workstation to boot without requiring a hard or floppy drive.

Client connections - realtime connections to local or remote servers. eg. ***Trend Server*** software or an OPC client

Comms Server - This is the communications server which manages the communications status of a recorder via a serial port or Ethernet connection.

Counters - For a User Counter to be used as a Cause, a User Counter must already be set up and be counting something. eg. a User Counter as an Effect of another Event.

Counters can be used as an Effect of an Event to count an occurence or to reset different types of counters.

Database(s) - A collection of information organised in such a way that a computer program can quickly select desired pieces of data.

Database Server - data bases administered by the database server. The database server is accessible by other users on the network.

Data bits - Smallest unit of information on a machine.

Dedicated network - A computer network in which one or more computers are set aside (or dedicated) as servers.

Dedicated server - A computer used exclusively as a network server.

Default Gateway - A configuration parameter transmitted to each network device. Where an IP Address cannot be found in a local network, the default gateway sorts out getting traffic from one subnet to another.

DHCP - Dynamic Host Configuration Protocol. Used for assigning dynamic IP address to devices on a network. With dynamic IP addresses, a device can have a different IP address every time it connects to the network.

DNS - Domain Name System (or Service), an Internet service that translates Domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP Address. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name might translate to 195.26.34.186. The DNS system is, in fact, its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

E-mail - Correspondence or data transmitted over computer telephone lines to a recipient via network lines or a service provider.

Ethernet - The worlds most popular network standard. A local area networking protocol for connection and interaction or communication between computers. Trendbus is transmitted over an Ethernet connection.

Ethertalk - What you call Ethernet when you use it on a Macintosh.

Fast Ethernet - An Ethernet standard which operates at 100Mbps rather than 10Mbps.

File server - A network computer containing disk drives that are available to network users. A computer library that stores a library of program and data files for a number of network users.

File Transfer Protocol (FTP) - A method of retrieving information from the internet. FTP are the rules that govern the transfer of data files within a computer or between computers.

FIXED - Fixed IP Resolution specified by user. Enter known IP address and Subnet Mask.

FPLB – Floating Point Little Endian Byte Swapped Format

FP B - Floating Point Big Endian Format

Handshaking - The protocol for identification and communication between two pieces of equipment.

Host - The home or controlling computer in a network of computers or printers.

Hub - A common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets. See passive hub, intelligent hub and switching hub

Intelligent hub - Intelligent hubs include additional features that enables an administrator to monitor the traffic passing through the hub and to configure each port in the hub. Intelligent hubs are also called manageable hubs.

IP Address - This is an identification for communication. An IP Address is a 32-bit number that identifies each sender or receiver of information that is sent in packets across the Internet.

IP Resolution - A mechanism which maps the IP Address to an Ethernet address. This is also known as an Address Resolution Protocol, or ARP.

IQOQ - This stands for Installation Qualification & Operation Qualification. This is a custom built report based on the configuration of a recorder.

Local Area Network (LAN) - A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building). Usually, the server has applications and data storage that are shared in common by multiple computer users. A local area network may serve as few as two or three users (for example, in a home network) or many as thousands of users

Local Database - Referred to in this manual this means a database held on your own PC.

MODBUS - Modbus™ is an industry standard protocol used in many SCADA packages for network control. The recorders can be inserted into existing networks using Modbus or linked directly to a controller over an RS485 link. Modbus TCP/IP is available through the Ethernet interface.

MODBUS X - Modbus X differs from the standard Modbus only by the 4 byte floating point order being reversed for application compatibility.

Mbps - Million bits per second. Transmission speed between computers and or other devices

Network - Two or more computers connected together by cable so that they can exchange information and resources. A network may be made up of computers, printers, scanners, or other devices.

Network drive - A drive that resides somewhere in the network rather than on your own computer.

Network interface card (NIC) - An adaptor card that lets the computer attach to a network cable.

Network server - A computer that stores and manages programmes, data and peripherals such as output devices for other computers and workstations connected through the network. Also called a file server.

OPC client - **OLE Process Control**. A software application that can be used to interface realtime data via the comms server.

Packets - Data is sent over a network in manageable chunks called packets or frames. The size and makeup of a packet is determined by the protocol used.

Parity - This ensures data is transmitted accurately and transfers correctly. The parity bit is added to every data unit (typically 7 or 8 bits) that are transmitted. The parity is set to either odd or even. Both the transmitting and receiving device must be set up the same.

Passive hub - A passive hub serves simply as a conduit for the data, enabling it to go from one device (or segment) to another.

Peer-to-peer network - A network in which any computer can be a server. A scheme in which networks computers share resources; each work station may either be client or server. See also Dedicated network.

PPP - **Point to Point Protocol**. This is an Internet protocol (IP) which packages the computers TCP/IP packets and forwards them to the Server. From the Server they can actually be put on the Internet. PPP has error detection and is preferred over SLIP.

Protocol - The rules of the network game, governing the transfer of data between a computer and peripherals. Protocols define standardisation formats for data packets, techniques for detecting and correcting errors.

Realtime data - Logging or graphing realtime data means that the software and the recorder have been synchronised in time to communicate the transfer of actual current ‘happening now’ data.

Remote Database/Server - Referred to in this manual as a database or server that is not directly connected to your workstation or PC (not on a local network).

RS232 - This protocol is useful for point-to-point communications at low speeds. For example, port COM1 in a PC can be used for a mouse, port COM2 for a modem etc. This is an example of point-to-point communication: one port, one device. RS232 was designed for communication of local devices, and supports one transmitter and one receiver.

RS485 - RS485 is used as a multiport communications: more devices may be connected to a single signal cable e.g. Ethernet networks, which use coaxial cable. Trendbus can be used via RS485 serial communications port.

Server - a computer or device on a network that manages network resources. For example, a File Server is a computer and storage device dedicated to storing files. A Network Server, is a computer that manages network traffic and a Database Server is a computer that processes database queries. Severs are often dedicated, meaning that they perform no other tasks besides their server tasks.

SLIP - Serial Line Internet Protocol for communication between two machines previously configured for comms with each other. PPP is preferred.

SMTP - Simple Message Transfer Protocol. This allows a device/computer to send messages to an e-mail server without having its own e-mail address.

Stopbits - Used to signify the end of a character string. Used for setting up constraints for Ethernet communications.

Subnet Mask - A single IP network can be divided into many subnets by using some of the MS bits of the host address portion of the IP address as a subnet. A mask is simply a screen of numbers that tells you which number to look at underneath. Using a mask saves the router having to handle the entire 32 bit address; it can simply look at the bits selected by the mask.

Switching hub - actually reads the destination address of each packet and then forwards the packet to the correct port.

Transmission Control Protocol/Internet Protocol (TCP/IP) - The standard procedure for regulating transmission on the Internet.

Trendbus RS485 - Custom protocol for connection and interaction or communications between computers and other peripherals, providing high levels of functionality and security.

WAP - Wireless Application Protocol. Secure specification allows user access to information instantly via hand held devices such as mobile phones with displays for Internet access.

Windows NT Server - Microsoft's premier server operating system ideal for running dedicated servers in small or large networks.

Windows™ Vista, Windows XP, Win2K3, Windows 7 (32 and 64 bit - Professional, Enterprise and Ultimate Edition), Windows 8 (32 and 64 bit-Professional, Enterprise and Ultimate), Windows Server 2008 and Windows Server 2012 - A multipurpose network operating system for running server applications and building internet capabilities as well as sharing files and printers etc.

Appendix A - Maths Expressions for 100mm &180mm recorders

A maths expression is made up of a number of terms. A term is the smallest valid component in a maths expression and can be a variable, operator or function. Certain operators and functions have the same effect in a maths expression - for example, ***$*** or ***SQRT*** will both perform the square root of an operand.

An operand may be a constant (i.e. a fixed number) or a ***variable***. The variables that can be used are described below.

In the following examples P1 (Pen 1) equals the result of the maths expression shown in the shaded area. A pen number (P1) will be automatically entered when a pen is selected.

- ***An*** - The letter 'A' followed by a number causes the reading taken from an analogue input (denoted by the number) to be inserted in the maths expression. In this example, the readings from Analogue Input 1 are being displayed on Pen 1.

  P1= A1

- ***In*** - The letter 'I' followed by a number causes the reading taken from a digital input (denoted by the number) to be inserted in the maths expression. In this example, the result of digital input 1 multiplied by digital input 2 is displayed on Pen 9. As digital inputs are read as either 1 or 0, the result of this maths expression will effectively be an AND function (i.e. digital inputs 1 and 2 must both be 1 for the value displayed on Pen 9 to be 1 - see *"Boolean Expressions" on page 262*).

  P1= I1*I2

- ***On*** - The letter 'O' followed by a number causes the state of a Relay output (denoted by the number) to be inserted in the maths expression. A Relay output is read as 1 when active and 0 when inactive.

  P1= O1

- ***Operators**** - can be either unary or binary. A unary operator requires one operand after it to make a valid expression, whereas a binary operator requires an operand on either side. For example # is a unary operator, as in ***#2*** (2 squared), whereas * is a binary operator, as in ***2*3*** (2 multiplied by 3). ***Not available on the ***100 mm key recorder***.

- Another feature on the ***100mm thumb recorder*** and the ***180mm recorder*** is MU (Memory use) DU, (Disk use) and PU***** (PC card use) gives a percentage reading of disk or memory space used. ***Not available on the ***100mm key recorder***.

  P1= MU

NB. When entering the MU and DU feature using *Trend Analysis Software*, ensure the Complex Variables box is ticked.

The available functions and operators for maths expressions are described below. Where a function and operator have the same effect they are listed together. A ***U*** after the operator denotes a unary operator and a ***B*** denotes a binary operator.

NB. Maths functions highlighted with a * in the Example column, are ***not*** available on the ***100mm key recorder.***

.

FUNCTION	EXPRESSION	EXAMPLE	DISPLAY
+	Add Operator + (B)	Analogue Input 1 added to Analogue Input 4 displayed on Pen 1	P1 = A1+A4
-	Subtract. Operator - (B)	Analogue Input 1 subtracted from Analogue 2 displayed on Pen 1	P1 = A2-A1
-	Negate. Operator - (U)	*The sign of the value Analogue Input 1is reversed. A reading of 6 would be displayed as -6 and vice versa	P1 = -A1
*	Multiply. Operator * (B)	The value of Analogue Input 2 multiplied by two	P1 = A2*2
/	Divide. Operator: / (B)	Analogue Input 1 divided by Analogue Input 3	P1 = A1/A3
SQRT	Square Root. Function: SQRT Operator: $(U)	*Pen 1 displaying the square root of Input 3 added to Input 4	P1 = SQRT[A3+A4] or P1 = $A3+A4
SQ	Square. Function SQ Operator: # (U)	*The value of Input 3 squared and displayed on Pen 1	P1 = SQ[A3] P1 = #A3
ROUND	Round. Function ROUND	*The value of Analogue Input 2 divided by four and rounded to the nearest whole number	P1 = ROUND[A2/4]
RECIPROCAL	Reciprocal. Operator ! (U)	*The reciprocal of the value of Analogue Input 2 is displayed on Pen 1. (An alternative way of writing this expression would be 1 / A2).	P1 = ! A2

FUNCTION	EXPRESSION	EXAMPLE	DISPLAY
ABS	Absolute. Function ABS Operator: & (U)	The result of Input 4 subtracted from Input 1 is always considered as positive. If A1 = 2, and A4 = 3.5, the value displayed on Pen 1 would be 1.5 not -1.5.	P1 = ABS[A1-A4] or P1 = & A1-A4
T	Assigns the Totalised value of a Pen	Pen 1 displays the Total of Pen 2 divided by 10 NB:Do not omit the divider (10), even if it is 1	P1 = T[2,10]
LOG	Logarithm to base 10. Function: LOG Operator: @ (U)	*Logarithmic value (LOG10) of Input 1 displayed on Pen 1.	P1 = LOG[A1] P1 = @A1
LN	Natural logarithm. Function: LN	*Natural logarithmic value (loge) of Input 2 displayed on Pen 1.	P1 = LN[A2]
LO	Low value. Function: LO	Pen 1 displays whichever is the lowest value out of Input 1 and Input 3. Note the inputs being compared are separated by a comma.	P1 = LO[A1,A3]
HI	High value. Function: HI	Pen 1 displays the highest value out of Input 1 and Input 3.	P1 = HI[A1,A3]
ROOT	Root. Operator: ~ (B)	*The third root value of Input 1 displayed on Pen 1.	P1 = A1~ 3
POWER	Power. Operator: ^ (B)	*The value of Input 2 to the power of 3 (or cubed) displayed on Pen 1.	P1 = A2^ 3
MODULUS	Modulus Operator:%(B)	The value of Input 2 (A2) is divided by 20 and the remainder ONLY is displayed on Pen 1. The signal will be within 0-19.	P1 = A2%2O
OVER	Over	If the analogue input 'A1' is greater than '10' then P1 will return the value of A1. Returns '0' if less than '10'.	P1 = OVER[A1,10]
UNDER	Under	If the analogue input 'A1' is less than '10' P1 will return the value of A1. Returns '0' if greater than '10'.	P1 = UNDER[A1,10]

FUNCTION	EXPRESSION	EXAMPLE	DISPLAY
INSIDE	Inside range	*P1 will equal 1 when 'x' stays within the ranges of 'y' and 'z'. P1 will return '0' if 'x' is not within the ranges of 'y' and 'z'.	P1 = INSIDE[x,y,z]
OUTSIDE	Outside range	*P1 will equal 1 when 'x' is outside the ranges of 'y' and 'z'. P1 will return '0' if 'x' is not outside the ranges of 'y' and 'z'.	P1 = OUTSIDE[x,y,z]
SIN	Sine	*The value of P1 equals the Sin of A1 A1 is in radians (2pi radians in every 360^{O}C)	P1 = SIN[A1]
COS	Cosine	*The value of P1 equals the cosine of A1 A1 is in radians (2pi radians in every 360^{O}C)	P1 = COS[A1]
TAN	Tangent	*The value of P1 equals the tangent of A1 A1 is in radians (2pi radians in every 360^{O}C)	P1 = TAN[A1]
F2C	F2C	*Converts Fahrenheit to Celsius	P1 = F2C[P2]
C2F	C2F	*Converts Celsius to Fahrenheit	P1 = C2F[P2]
A	Indexed analogue	P1 is equal to the indexed analogue input 1+I1 (If I1 = 1, P1 = A2) (If I1= O, P1 = A1)	P1 = A[1+I1]
I	Indexed digital input	P1 is equal to the indexed digital input of 1 + O1 (If O1 is 1, P1 = I2)	P1 = I[1+O1]
O	Indexed relay output	P1 is equal to the indexed relay output of 1-A1 (If A1 = O, P1 = O1)	P1 = O[1-A1]
EVAL	Evaluate	*Returns 0 if x = O, otherwise returns 1	P1 = EVAL[x]
RAV	Rolling Average. Function: R	P1 displays the rolling average of: x = analogue input eg. A1 y = number of samples, Max 500 z = sample interval (ms)	P1 = RAV[x,y,z]
DELAY	Delayed value	P1 equals the 'Delay' of input A1, number of samples (10), every second (1000 ms)	**P1 = DELAY[A1,10,1000]**

FUNCTION	EXPRESSION	EXAMPLE	DISPLAY
Exp	**Expotential**	***Calculates the value of the exponentional. (P1 = 7.389056)**	P1 = EXP [2]
FL	**Floor**	***Rounds down to the nearest whole number**	P1 = FL[x]
CE	**Ceiling**	***Rounds up to the nearest whole number**	P1 = CE[x]
CJC	**Cold Junction Compensator**	**P1 displays the value of the CJC 'x' is the board number from 1 to 4**	P1 = CJC[x]
CA	**Alarm counter**	***Where 'x' is the Alarm number, P1 will return the alarm count value**	P1 = CAx
CD	**Digital counter**	***Where 'x' is the Digital input number, P1 will return the Digital count value**	P1 = CDx
CE	**Event counter**	***Where 'x' is the Event number, P1 will return the Event count value**	P1 = CEx
CU	**User counter**	***Where 'x' is the User counter number, P1 will return the User count value**	P1 = CUx
ASIN	**Inverse of SIN**	***The value of P1 equals the inverse SIN of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = ASIN[A1]
ACOS	**Inverse of COS**	***The value of P1 equals the inverse COS of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = ACOS[A1]
ATAN	**Inverse of TAN**	***The value of P1 equals the inverse TAN of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = ATAN[A1]
SINH	**Hyperbolic SIN of 'x'**	***The value of P1 equals the hyperbolic SIN of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = SINH[A1]
COSH	**Hyperbolic COS of 'x'**	***The value of P1 equals the hyperbolic COS of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = COSH[A1]
TANH	**Hyperbolic TAN of 'x'**	***The value of P1 equals the hyperbolic TAN of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = TANH[A1]

FUNCTION	EXPRESSION	EXAMPLE	DISPLAY
ASINH	**Inverse hyperbolic SIN of 'x'**	***The value of P1 equals the inverse hyperbolic SIN of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = ASINH[A1]
ACOSH	**Inverse hyperbolic COS of 'x'**	***The value of P1 equals the inverse hyperbolic COS of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = ACOSH[A1]
ATANH	**Inverse hyperbolic TAN of 'x'**	***The value of P1 equals the inverse hyperbolic TAN of A1. A1 is in radians (2pi radians in every 360^{O}C)**	P1 = ATANH[A1]
AL	**Alarm Status**	**P1 displays the Alarm status for AL1. 64 alarms available, AL1 to AL64 Returns '1' for an active alarm and '0' for an inactive alarm**	P1 = AL1
ALEV	**Alarm Level**	**P1 will display the Alarm level setup for pen 3 (ALEV3). Use ALEV1 to ALEV 64**	P1 = ALEV3

NB. Maths functions highlighted with a * in the Examples column, are ***not*** available on the ***100mm key recorder***.

Operator Precedence

The precedence of an operator specifies how tightly two expressions are tied together. For example, in the expression 1 + 5 * 3, the answer is 16 not 18 because the multiplication "*" operator has a higher precedence than the addition "+" operator. Parentheses may be used to force precedence, if necessary. Eg. (1 + 5) * 3 evaluates to 18.

If two operators have equal precedence they are evaluated from left to right.
Eg. 6 - 4 + 2 * 3 = 8 (multiply first, then from left to right for the equal values).

The same equation with parenthesis can change what you calculate first.
Eg. 6 - (4 + 2) * 3 = -12 (brackets first, then muliply, then the equal values from left to right)

NOTE Round brackets are for precedence and square brackets are for functions.

Examples of expressions set up for Pen 1:

LOG [P2]*30

The logarithmic value (to base 10) of Pen 2 is then multiplyed by 30.

(P3+P4)%100

The value of Pen 3 and 4 are added together then the Modulus function is applied. This is where the sum is divided by 100 and only the remainder will be displayed.

ABS[(COS[P2/30]*100)]

The Cosine of Pen 2 divided by 30 is then multiplyed by 100. Then the Absolute function is applied (if the result is positive or negative absolute will always display as a positive).

Precedence order		
Function	**Expression**	**Associativity**
SQRT	Square Root. operator **$**	left to right
SQ	Square. operator **#**	
ABS	Absolute. operator **&**	
RECIPROCAL	Reciprocal. operator **!**	
LOG	Logarithm. operator @	
POWER	Power. operator **^**	right to left
ROOT	Root. operator **~**	
-	(negate)	(unary minus) left to right
MODULUS	Modulus. operator **%**	left to right
/	Divide. operator **/**	
*	Multiply. operator *****	
-	Subtract. operator **-**	left to right
+	Add. operator **+**	

Spaces are not recognised in maths expressions and the expression can be written anywhere within the 250 character text field.

P1 = ROUND[$(A3)]

More than one set of brackets can be used in a maths expression. For example, if you wanted the value of the square root of Analogue Input 3 to be rounded to the nearest whole number the expression would be written in one of three ways as shown opposite.

P1 = #(SQRT[A3])

The Square Root function can be written as the operator **$** or as the function **SQRT**.

In the first and third example the round brackets surrounding ***A3*** can be omitted - they are included to make the expression easier to understand.

P1 = #($(A3))

Constants

A ***Constant*** can be added to the end of a Maths equation.
These are the constants available.

Constant	Value	Description
PI	3.14159	The ratio of the circumference of a circle to its diameter
C	2.99792e+008	Speed of light
Vmol	22.4138	The molar volume, in units ml/mole
g	9.80665	Gravity
Planck	6.62608e-034	Equal to the ratio of the energy E of a quantum to energy to its frequency
Boltzmann	1.38066e-023	Average energy of a molecule to its absolute temperature
Charge e	1.60218e-019	Elementary charge (electron, proton)
Avogadro	6.02214e+023	Number of particles per mole of particles

Boolean Expressions

Boolean expressions can be performed using Relay output (**O**) and Digital input (**I**) variables. At a basic level ***AND*** and ***OR*** functions can be performed by using the * and + operators respectively between the above variables. More significantly, these variables and operators can be used to enable or disable certain segments of a maths expression, as illustrated in the following example.

Example:- The temperatures of two adjacent kilns are being monitored. Kiln 1 is being monitored on Analogue Input 1 of a recorder, and Kiln 2 on Analogue Input 2. It is noticeable that when Kiln 1 reaches a temperature above 750 °C, the Kiln 2 temperature increases by 2% of the Kiln 1 temperature. How can the recorder be set up so that this 2% increase is ignored?

1. A high alarm on Analogue Input 1 is set so that when the temperature reaches above 750 °C Relay output 1 is activated.
2. Set the maths expression for Analogue Input 2 as P2 = A2 - ((A1/50) * O1). This means that when the temperature of Kiln 1 is below 750°C, O1 = 0 so the above expression will be P2 = A2.

When the temperature is above 75 0°C, O1 = 1 so the term A1/50 (which is 2% of the value of A1) will be subtracted from the value of A2. This will give the temperature of Kiln 2 as it would be without the effect of Kiln 1.

Maths and Fail Safe

When using output relays in a maths expression be aware the maths is reporting the literal state of the relay.

If Pen 1 (P1) equals output channel 4 (O4) and fail safe is On with no alarm triggered, the relay will be energised and P1 will return 1.

P1= O4

Appendix B - Maths Expressions for X & GR Series Recorders

Full Maths & Script Processing

The **X Series** and **GR** recorders are supplied with Basic Maths functions: Add, Subtract, Divide and Multiply. There are two further options that can be added, Full Maths and an extremely powerful Scripting processing module. Scripting delivers an additional level of enhanced capabilities with multi line script processing. Full and Scripting Maths must be activated in the recorder as a Firmware credit option. (Scripting is not available on the **QXe, GR1**).

When a recorder setup is loaded into the ***Trend Analysis*** software the Maths capabilities will be transferred with the setup. If you are creating a new recorder in ***Trend Analysis*** software to be transferred to a recorder the Maths capabilities will be available but will only become active if the recorder has the same Maths functions enabled.

This document provides the Maths Variable and Function table and examples of the capabilities from the simple to the complex to assist the user in understanding the concepts and potential of these features.

*** Important Note, Full Maths and Script functions are Options and must be enable using the Credit System. Be sure to enable these options or they will not be available. *See "Credits tab" on page 62.*

Notes:

- if, elseif & else are followed by expressions in "curly brackets" {….}
- lines within the curly brackets always end in semicolon e.g. ;
- every execution path must have a return statement
- every expression within curly brackets "{…}" must include a "return"
- Small values (fractions) entered into a maths expression will require a zero before the decimal point. Eg. 0.5
- Outputs that are set to Single Pulse should not be used as a part of a maths expression as it can cause spurious values.
- No white spaces
- Syntax is not case sensitive
- 500 character limit for scripting

> **NOTICE**
>
> Full Maths and Scripting functions are Options and must be enable using the Credit System. Be sure to enable these options in the recorder or they will not be available. *See "Credits tab" on page 62.*

All of the following tables display functions available in Full and Scripting Maths unless otherwise stated.

Maths Variable and Function Tables

Table 13.7 : Maths Variable Table

Maths Variables	Syntax	Description
Alarm Level	PnAxL	Gets the Alarm Level, n is Pen number 1 to 96 and x is alarm number 1 to 6
Analogue Input (Eng values)	An	Get the value of Analogue n (1 to 48) in Engineering units
Analogue Raw (Electrical values)	RAn	Get the value of Raw Analogue n (1 to 48) in Electrical values
Batch Mode	BATMD	Returns 1= batch running, 2 = batch stopped or 3 = batch paused
Batch comment list	blcomm[x]	Get index of Batch comment list entered on batch start, where X is the group number (1 - 6)
Batch description list	bldesc[x]	Get index of Batch description list entered on batch start, where X is the group number (1 - 6)
Batch lot number list	bllot[x]	Get index of Batch lot No list entered on batch start, where X is the group number (1 - 6)
Batch name list	Blname[x]	Get the index of Batch name list entered at batch start. Where x is the group (1-6)
Batch user list	Bluser[x]	Get the index of Batch user list entered at batch start. Where x is the group (1-6)
Blkv	BLKVx	Get the local variable x. This variable is local to this script. There is a maximum of 20 local variables per script.
Compact Flash or SD card free storage space*	CFFREE	Returns the percentage of free storage space available on the Compact Flash or SD card
CJC	CJCn	Get the Board CJC value. N = 1 to 6 (Returns value in Degrees F, C or K depending on the localisation setting
CJC in Degrees C	CJCnC	Get the Board CJC value. N = 1 to 6 (Always returns value in degrees C)
Comms Variables	CVn	Get the Comms variable n = 1 to 96
Digitals	Dn	Get the value of Digital Input n (1 to 48)
Digital Input bit pattern	DIOn	Get the 16 bit pattern from the DIO slots, where n= 1,2 or 3 (Slot G, H & I respectively). Returned as a 16 bit word (0 to 65535). A channel configured as an output is set to 0.
EC1 to EC 20	EC1	Event Counters 1 to 20
File Transfer Protocol recording hours left	FTPHRS	Returns the number of hours of “safe” recording time available
Glbv	GLBVx	Get the global variable x. This is a global variable accessible to all scripts. There is a maximum of 200 global variables.

Table 13.7 : Maths Variable Table

Maths Variables	Syntax	Description
HPC1 to HPC48	HPC1	High Pulse count using Pulse cards
Internal memory hours left	INTHRS	Returns the amount of hours left until the internal memory starts to recycle (over-write).
IOC1 to IOC48	IOC1	Digital Input/Output counters for Digital in and relay out
LPC1 to LPC48	LPC1	Low Pulse count using Digital IO cards in pulse count mode
Pen	Pn	Get the value of Pen n (1 to 96)
Pen Minimum Value	PnMINU	Gets the Pen Minimum value n = 1 to 96
Pen Maximum Value	PnMAXU	Gets the Pen Maximum value n = 1 to 96
Pen report Maximum Value	prmax[x,y,z]	Gets the Pen Maximum value for a report. x = pen number (1 to 96). y = period (1 = hour, 2 = day, 3 = week, 4 = month). z = report set (1 = current, 2 = previous completed)
Pen report Minimum Value	prmin[x,y,z]	Gets the Pen Minimum value for a report. x = pen number (1 to 96). y = period (1 = hour, 2 = day, 3 = week, 4 = month). z = report set (1 = current, 2 = previous completed)
Pen report Average Value	prave[x,y,z]	Gets the Pen Average value for a report. x = pen number (1 to 96). y = period (1 = hour, 2 = day, 3 = week, 4 = month). z = report set (1 = current, 2 = previous completed)
Pen report Totaliser Value	prtot[x,y,z]	Gets the Pen Totaliser value for a report. x = pen number (1 to 96). y = period (1 = hour, 2 = day, 3 = week, 4 = month). z = report set (1 = current, 2 = previous completed)
Power Relay	PWRREL	Returns the status of the fixed power relay
Pstv	PSTVx	Get the persisted Global variable x. Persisted global variables maintain their value through a power cycle. There is a maximum of 50 persisted global variables.
PRC	PRC	Power Relay Counter
Pulse Inputs (AI slots)	HPULn	Get the Pulse frequency from the Pulse card n = 1 to 48 (25kHz max)
Pulse Inputs (DIO Slots)	LPULn	Get the Pulse frequency from the Digital Input card when in Pulse mode n = 1 to 48 (1kHz Max)
RT Compensation	RTCOMPn	Get RT Compensation value for channel n (1 to 48) Units mV
RT Calibration	RTCALn	Get RT Calibration value for channel n (1 to 48). Units mA
Slave Comms Variable***	SCV[1,1,1]	Returns the value for the Modbus Slave Comms

Table 13.7 : Maths Variable Table

Maths Variables	Syntax	Description
Totaliser	Tn	Get Totaliser value n = 1 to 96
UC1 to UC16	UC1	User counters 1 to 16
USB1 free storage space	USB1FREE	Returns the percentage of free storage space available on the USB storage key fitted initially (front or rear).
USB2 free storage space	USB2FREE	Returns the percentage of free storage space available on the USB storage key fitted after the first USB has been fitted (front or rear).
UV1 to UV32	UV1	This allows a system to be setup where values can be altered to effect calculations without having to change the configuration

*Compact Flash is not available on the **QXe, GR1**.

** See Comms variable.

*** Slave Comms Variable.

Table 13.8 : Maths Function Table

Maths Functions	Syntax	Description
Add	+	Returns the result of the addition
ACos*	acos[x]	Returns the Arc COS of x
ASin*	asin[x]	Returns the Arc SIN of x
ATan*	atan[x]	Returns the Arc TAN of x
Ceiling	ceil[x]	Round up x to the nearest whole number
Clear Event**	CLRE[x]	Where x is the event number to be cleared (1 to 20).
Cos*	cos[x]	Returns the COSINE of x
CosH*	cosh[x]	Returns the Hyperbolic COSINE of x
Damp	damp[x,y,z]	x = input, y = Pen (pen variable being used) and z = damping limit in engineering units. *See "Damping examples:" on page 268.*
Divide	/	Returns the result of the division
Eval	eval[x]	Returns 1 if x is non zero, otherwise returns zero
Exponent	exp[x]	Returns the Exponential of x

Table 13.8 : Maths Function Table

Maths Functions	Syntax	Description
Floating point Absolute	fabs[x]	Returns the Floating Point Absolute value of x
Floor	floor[x]	Round down x to the nearest whole number
Get Screen Number	GETS[x]	returns the current screen number, where x in the screen number. this can be used to detect what screen is being displayed
Global Alarm Status	ATOTt[x]	ATOT[0] will return the total number of alarms that are currently enabled in the recorder. ATOT[1] will return the total number of alarms “in Alarm” state in the recorder. E.g P1= ATOT[1]/ATOT[0] * 100 would set P1 to give alarm state percentage for the recorder.
Ln	ln[x]	Returns the Natural Log of x
Log	log[x]	Returns the Base 10 Log of x
Modulus	x%y	Returns the value of x with a modulus of y
Multiply	*	Returns the result of the multiplication
Power	pow[x,y]	Returns the value of x raised to the power y. Can also be represented by ^
Power	x^y	Returns the value of x raised to the power y.
Reciprocal	recip[x]	Returns the reciprocal of x (i.e. 1/x)
Root	root[x,y]	Returns the y root of x
Round	round[x]	Rounds x to the nearest whole number
Set/clear a digital output	SETD[x,y]	This feature allows a digital output to be set or cleared from a script, using the function SETD[x,y] where x is the digital output 1 to 49 (where 49 is the power relay) and y is the value 1 to set or 0 to clear. The function will return the value set if successful, if not successful it will return -1.0, this would be caused by trying to set and digital input rather then output.
Set User variable	UVSET[x,y]	Returns the result of x = the user variable and y = the value.
Sin*	sin[x]	Returns the SIN of x
SinH*	sinh[x]	Returns the Hyperbolic SIN of x
Square Root	sqrt[x]	Returns the Square Root of x
Square	sq[x]	Returns the square of x (i.e. x multiply by x)
Subtract	-	Returns the result of the subtraction
Tan*	tan[x]	Returns the TANGENT of x
TanH*	tanh[x]	Returns the Hyperbolic TANGENT of x
Trigger an Event**	TRIGE[x]	This will trigger Event x (1 to 20). TRIGE[x] will return 1 when the event is fired otherwise it will return 0.

* Functions use radians (2π radians = 360 degrees)

***** Event triggering from scripts***

This feature allows any enabled event with an enabled effect (does not have to have any causes enabled) to be triggered from within the scripting system using the following function, TRIGE[x] where x is the event 1 to 20. Once an event is triggered using scripting the event is locked and cannot be triggered again from scripts until the lock is cleared using the clear event function CLRE[x] where x is the event number 1 to 20. This prevent successive executions re-triggering the same event. As a further measure to avoid the system being overloaded by events from within the script system, each time an event is triggered from within a script it will apply a 1 second automatic lock preventing the same event from being triggered more then once a second, irrispective of the CLRE[x] being called for that event.

Damping examples:

Example 1: if P1 was measuring degrees C the expression P1 = damp[A1, P1, 3] will damp the signal with changes up to 3 degrees C, any change over 3 degrees between readings will be damped but by a small amount.

Example 2: P5 = damp[A2, P5, A3] will damp the A2 input up to a level determined by input A3, note the reference parameter (P5) is always the same as the pen it is being used in, this should always be the case.

Table 13.9 :

Compare & Convert	Syntax	Description
%RHc	rhc[x,y]	Returns % Relative Humidity with y as the dry bulb temperature in degrees C, and x the wet bulb temperature in degrees C
%RHf	rhf[x,y]	Returns % Relative Humidity with y as the dry bulb temperature in degrees F, and x the wet bulb temperature in degrees F
C2f	c2f[x]	Converts a temperature in C to one in F
F2c	f2c[x]	Converts a temperature in F to one in C
Hi	hi[x,y]	Returns the larger value of x & y
Hi4	hi4[x,y,x1,y1]	Returns the larger value of x, y, x1,y1
Inside	inside[x,y,z]	Returns x if between y & z, otherwise returns 0.
Lo	lo[x,y]	Returns the lower value of x & y
Lo4	lo4[x,y,x1,y1]	Returns the lower value of x, y, x1, y1
Outside	outside[x,y,z]	Returns x if outside of y & z, otherwise returns 0
Over	over[x,y]	Returns x if it's larger than y, otherwise returns 0
Under	under[x,y]	Returns x if it's less than y, otherwise returns 0.

Table 13.10 : Timers

Timers	Syntax	Description
Tget	tget[x]	Returns the elapsed time of timer x since start
Tpause	tpause[x]	Pauses the timer x
Treset	treset[x]	Resets the timer x
Trun	trun[x,y]	Starts the timer x in y mode. (Mode 1 = reset to 0 and run, Mode 0 = resume from previous value)

Timers must return a value. All timer commands must have “BLKV1 = the variable“ e.g.BLKV1 = tpause[1]. Value returned is the same as tget[1]. Timers count in seconds.
Maximum of 20 timers available.

Table 13.11 :

Accessors	Syntax	Description
Ai	Ai[x]	Get the value of Analogue Input number x
Alamct	Almct[x,y]	Get the current alarm count for Pen x, Alarm y (the alarm number as identified in alarm messages)
Alamrt	Almrt[x,y]	Get the current alarm number for Pen x, Alarm y
Alamsl	Almcl[x,y,z]	Get the current alarm level set . Pen = x (1-96), Alarm = y (1-6), New level to set = z. Eg. P3 = almsl[1,1,A3] will set Pen 1 alarm1 and shoe A3 pn P3.
Alamst	Almst[x,y]	Get the current alarm state for Pen x, Alarm y (I = active 0 = inactive)
Di	Di[x]	Get the state of Digital input number x
Glbv	Glbv[x]	Get the value of global variable number x
Locv	Locv[x]	Get the value of local variable number x
Pen	Pen[x]	Get the value of Pen number x
Tot	TOT[x]	Get the current value of totaliser x

Table 13.12 :

Boolean Operators	Syntax	Description
AND	&&	Returns a true or false result from testing if two tests are both true. e.g. IF (A1==GLBV1) && (A2!=GLBV2)
Assign	=	Assigns one variable to another. e.g.GLBV1=A1. (GLBV1 becomes the value of A1).
Equal to	==	Returns a true or false result from testing if two variables are equal to each other. e.g. IF (A1==GLBV1)
Greater than	>	Returns a true or false result from testing if one variable is greater than another
Greater than or equal to	>=	Returns a true or false result from testing if one variable is greater or equal to than another
Less than	<	Returns a true or false result from testing if one variable is less than another
Less than and equal to	<=	Returns a true or false result from testing if one variable is less than or equal to another
NOT	!	Returns true if the result is 0, otherwise returns false.
Not equal to	!=	Returns a true or false result from testing if two variables are not equal to each other. e.g. IF (A1!=GLBV1)
OR	||	Returns a true or false result from testing if one or other or both tests are true. e.g. IF (A1==GLBV1) || (A2!=GLBV2)
XOR	~	Returns a true or false result from testing if one or other (but not both) tests are true. e.g. IF (A1==GLBV1) ~ (A2!=GLBV2)

Functions for Scripts

(Scripting is not available on the **QXe, GR1**).

Scripts evaluate at whatever the Analogue sample rate is set to.

There is 500 character limit for scripting.

Table 13.13 :

Functions for Scripts	Syntax	Description

Else	else	Steps into brackets to run. Must always finish with a return.
		else
		{
		return y;
		}

Elseif	elseif(x)	Carries out a conditional test and if true steps into brackets to run. Must always finish with a return.
		elseif (x>4)
		{
		return y;
		}

First run	(FIRSTRUN)	Returns true if the script is being run for the first time, otherwise returns false

If	if(x)	Carries out a conditional test and if true steps into brackets to run. If false, steps to next test without operating the contents of the brackets. Next step will be either *elseif* or *else*.
		Must always finish with a return.
		If (x>5)
		{
		return y;
		}

Set Changed	(SETUPCHANGED)	Returns true if the setup has been changed, otherwise returns false
Time Changed	(TIMECHANGED)	Returns true if the time has been changed, otherwise returns false

Full Maths

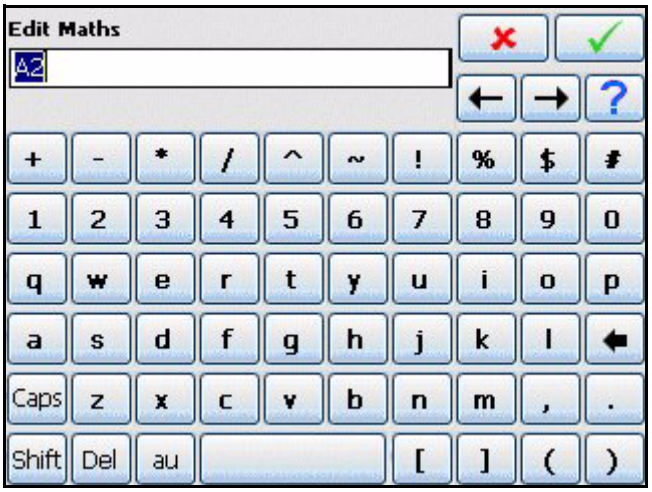
Full Maths functions provides a simple and intuitive method for the user to carry out numerous mathematical functions. Some examples are shown below

Table 13.14 : Full Maths examples

Full Maths examples	
P4=lo[A1,A2]	Pen 4 shows the result of the lowest of either A1 or A2
P3=(A1+A2)*SQRT[A3]	Pen 3 shows the result of Analogue input 1 added to Analogue input 2, all multiplied by the square root of Analogue input 3
P4=GLBV1	P4 shows the Global Variable 1

NOTICE

Please note **"Pn=" is not entered in the Maths Block** and is assumed by the Recorder e.g. To enter the equation P2=A2, the user would just type A2



Script Function Application Examples

(Scripting is not available on the **QXe, GR1**).

To enter a script for a Pen, ensure that “Maths Type” in the Pen Menu is set to Scripting.

Example 1

4 flow meters are fed into the recorder to trend, totalise and record daily flow. The application requires that the user must know and record which flow meter is outputting the highest flow at any particular time. This can of course be derived from the four lots of recorded data, but not only is this extra analysis later, but a real time display is required.

The application is easily solved by using the Script Function in the recorder, represented in pseudo code the script is as follows:

If input 1 is bigger than all the others, then make the global variable (1) equal to channel 1, and display and record input 1.

If input 2 is bigger than all the others, then make the global variable (1) equal to channel 2, and display and record input 2.

If input 3 is bigger than all the others, then make the global variable (1) equal to channel 3, and display and record input 3.

If none of the above are correct then Input 4 must be the highest, so make the global variable (1) equal to channel 4, and display and record input 4.

Display the global variable (1) on another pen to show which channel is biggest at any given time.

Pen 5 is chosen to record the highest channel input, and channel 6 is chosen to record which input is the highest.

The greater than “>” is used, the AND “&&” Boolean is also used, and the global variable GLBV1 is used to hold the current highest channel number.

Converting this to an actual script gives the following:

```
If ((A1>A2)&&(A1>A3)&&(A1>A4))        This tests if flow meter 1 is more than 2, 3 and 4
{
GLBV1=1;                              If yes, then set display indicator to meter 1
return A1;                            And return the current flow reading
}

elseif ((A2>A1)&&(A2>A3)&&(A2>A4))    This tests if flow meter 2 is more than 1, 3 and 4
{
GLBV1=2;                              If yes, then set display indicator to meter 2
return A2;                            And return the current flow reading
}
```

```
elseif ((A3>A1)&&(A3>A2)&&(A3>A4))     This tests if flow meter 3 is more than 1, 2 and 4
{
GLBV1=3;                               If yes, then set display indicator to meter 3
return A3;                             And return the current flow reading
}

else                                   If none of the above are true, then 4 is biggest
{
GLBV1=4;                               So set display indicator to meter 4
return A4;                             And return the current flow reading
}
```

In this application, the flow meters are connected to inputs 1, 2, 3 and 4 at the rear of the recorder, and these are recorded on Pens 1 to 4

P1=A1

P2=A2

P3=A3

P4=A4

Pen 5 has the script above, which records and displays the highest flow rate of the four.

Pen 6 is set to record and display the input (between 1 and 4) that is the highest rate

P6=GLBV1

> NOTICE
>
> Please note **"Pn=" is not entered in the Maths Block** and is assumed by the Recorder e.g. To enter the equation P2=A2, the user would just type A2

Example 2

In the same application as above, the user has noticed that whilst flow meter 2 normally has the highest flow rate, on occasion a surge in flow meter 3 causes problems down stream. The user needs to monitor the two inputs and count the number of times flow meter 3 reading exceeds that of flow meter 2.

The code consists of the two flow meter readings, and a change counter that totals the number of times that flow 3 exceeds that of flow 2.

The pseudo code is written as:

If flow meter 3 has a larger reading than flow meter 2, check to ensure that it was already greater than meter 2, if it was return the latest change count value.

If it was not greater than meter 3 last time, set a flag to indicate a change and increment the change counter by 1, then return the latest change counter.

If flow meter 3 is less than 2, simply return the change count value with no increment.

Pen 7 is used to implement this script and is implemented as follows

```
if (A3>A2)                          Tests if A3 is bigger than A2
{
        if(BLKV1==1)                If it was then tests if A3 was bigger than A2 last time period
        {
        return BLKV2;               If it was return with the current change counter
        }
        else                        If not then
        {
        BLKV1=1;                    Set flag to show that A3 has just exceeded A2
        BLKV2=BLKV2+1;              Increment the change counter by 1
        Return BLKV2;               Return the new change counter total
}       }
else                                If A3 is not bigger than A2
{
BLKV1=0;                            Set flag to show A2 is bigger than A3 this time
Return BLKV2;                       Return current change counter
}
```

With script above, BLKV (all Variables) are used to maintain values. It should be noted that BLKV's do not persist over a power removal, and if the application were to require a non-volatile count, then BLKVn should be substituted with PSTVn.

Example 3

The application described in Examples 2 and 3 is to be extended to totalise the amount of time that Input 1 is the highest of 1, 2, 3 & 4.

Again scripting can be used to easily solve this requirement.

The Pseudo code is written as

If input 1 is indicated as the current highest value, then display the timer.

If input 1 is not the highest input value, then stop totalising time and return the current timer value.

We know that in Example 1, the highest value channel number is contained with GLBV1, and as this is a global variable it is also accessible from this script.

```
if (GLBV1==1)                    Tests if the global variable 1 is equal to channel 1
{
BLKV1=trun[1,0];                 If it is then keep the timer running without resetting
return tget[1];                  Return the current timer value
}

else                             If not then
{
BLKV1=tpause[1];                 Pause the timer
return tget[1];                  Return the current (paused) timer value
}
```

Note in this script above there is no way to reset the timer, this could be modified to allow the user to reset this timer from a switch fed into a digital input as follows:

```
if(D1!=1)                                Tests if the DI 1 is not set
{                                        If it isn't then
        if (GLBV1==1)                    Tests if the global variable 1 is equal to channel 1
        {
        BLKV1=trun[1,0];                 If it is then keep the timer running without resetting
        return tget[1];                  Return the current timer value
        }
        else
        {                                If not then
        BLKV1=tpause[1];
        return tget[1];                  Pause the timer
        }                                Return the current (paused) timer value
}
else                                     If it is
{
BLKV1=treset[1];                         reset the timer 1 to zero
return tget[1];                          return the current (zeroed) timer value
}
```

Example 4

Commenting in Scripts

This is an example of how commenting can be used in scripts.
you can use the standard C++ commenting, inline comments use \\

for example

```
if ( A1 > 10 )
{
   return 9;       // If A1 greater then 10 return 9
}
```

or for block (single or multiline commenting the /* to open and */ to close, these are C style comments and work as follows

```
if ( A1 > 10 )
{
   return 9;       /* If A1 greater then 10 return 9 */
}
```

for single line or

```
if( A1 > 10 )
{
   /* if A1 is greater then 10 then return 9
   */
   return 9;
}
```

these are also useful for commenting out code to try different things, for example

```
if( A1 > 10 )
{
   return 9;
}
/*
else
{
   return 20;
}
*/
return A1;
```

Here the else statement is "commented out" so it won't be included but can easily be re-introduced if required.

Maths Error Messages

When the Maths functionality is processing through the scrips you have written it will carry out Syntax and other checks. When it comes across operations, functions, brackets, etc. not expected or permitted it will report an error. However, the fault being reported may be on a previous line caused by the missing or incorrect function. Refer to Application Note 43-TV-07-32 on your CD or web site for a list of scripting error messages.

Appendix C- Fuzzy Logging

What is Fuzzy Logging?

Fuzzy Logging is a real time **Data Compression** technique, is an alternative to the more standard methods of recording data.

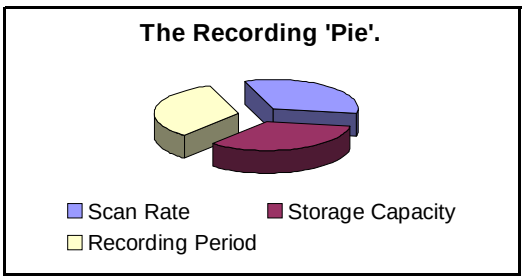
Paperless Recorders are primarily used for exception recording. They spend most of their life trending and recording straight lines. Fuzzy Logging has been developed to improve the efficiency of data storage, and is particularly effective in exception recording examples where normal operation consists of generally static inputs.

Fuzzy Logging looks for straight lines in the data stream, in real time, whether they are horizontal, climbing or descending. A straight line made up of say 10 points can be equally well represented by 2 points, one at either end, the other 8 points are redundant. Fuzzy logging works by creating straight lines in the data and discarding redundant points.

What's it for?

…… To help the user in the trade off between **Scan Rate**, **Disk capacity** and **Recording Time,** after all the 'Pie' is only so big.

Fuzzy Logging has been developed to help maximise all three sections, in effect increasing the size of the 'Pie'.



The result is a technique that delivers a host of real world benefits over the more traditional recording methods.

1. Disks take longer to fill – changed less frequently, less site visits.
2. Faster scan rates can be used for any given disk size – giving greater resolution on the process.
3. Recording time can be extended.
4. Less hard disk memory required for archiving on the PC.
5. Quicker graphing of data.
6. Smaller data files for remote collection.

OK. How does it work?

Fuzzy Logging does not log data points that form part of a straight line. The technique is best illustrated by the diagram below:

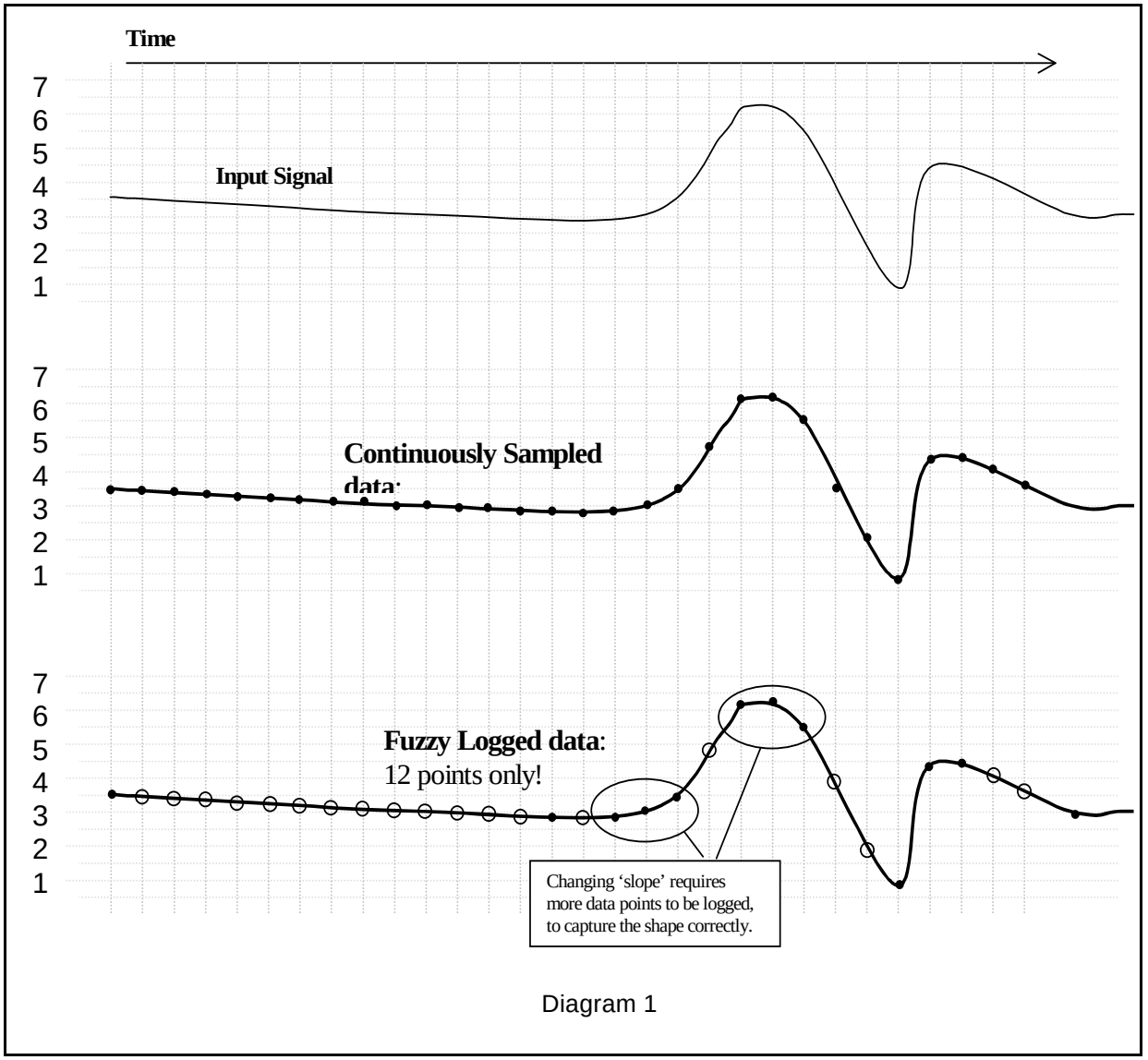

Time
Input Signal
Continuously Sampled data:
Fuzzy Logged data:
12 points only!
Changing 'slope' requires more data points to be logged, to capture the shape correctly.

Diagram 1

Points marked: ○ are **NOT** logged, as they lie on an 'imaginary' straight line between points marked:●

The graph of the Fuzzy Logged data, looks identical to the graph of the sampled data, but has taken ***less than half the points*** to build it.

Sounds Great! But what about 'Spikes' on my trend line. Won't it miss them?

NO, you will not miss any 'Spikes', 'Glitches' or 'Transients' – these are what you need to see!

As Fuzzy Logging is an adaptive technique, it will log as fast as it needs to in order to capture everything.

Although not all points are logged, the base 'Scan Rate' of the input is the same as if you were using a standard logging technique.

OK, but what about slowly drifting inputs?

Again – **No Problem**. The algorithm is processed in 'Real Time', i.e. as the reading is taken. As it already knows the previous logged readings it can calculate where the next point should be (assuming it's on a straight line) – if the measured value does not equal the predicted value, the point is logged as it no longer forms part of the straight line.

Fuzzy Logging, looks for straight lines – ***at any angle.*** Not just on the horizontal.

I'm convinced. Do you have any examples?

Example 1.) Flow & Pressure Measurement of Mains Water Pressure

A recorder was installed, to monitor the flow of a mains water supply. At peak demand the mains pressure had been subject to sharp drops in pressure and flow rate, and it was necessary to find the cause of the problem.

- The recorder had to have a fast scan rate, in order to capture the 'glitches'.
- The recording period would be over many days if not weeks, so storage capacity was at a premium.

A fast scan rate using the standard sampling method would result in a disk life of about a day, which was not acceptable.

As this application consists of long periods of little activity (relatively constant flow rate), and short periods of high activity (rapidly changing flow rate), it is an ideally suited to Fuzzy Logging.

During the hours of stable flow where the flow rate remained more or less constant, the Fuzzy Logging technique would give compression ratios up to 100 times. However, as soon as a glitch appeared the fast sampling rate was able to capture and store all the points.

Example 2.) Cold Storage Temperature Measurement

A recorder was required to help track random and rapid temperature changes within the cold storage rooms. Conventional sample recording had shown that temperature variations were present, but was not of high enough resolution to pin point the cause.

Again as in example 1), the measured inputs would show long periods of stable constant readings, interspersed with small sharp increases in temperature. In order to track the cause of these variations, it was necessary to maximise the time resolution of the data. This application was ideally suited to the Fuzzy Logging data storage technique, as the periods of inactivity would result in compression rates of over 50 times.

Example 3.) Logged Data Example

The diagram below is a sample of actual logged data in both the Fuzzy Logging method (top) and Sample Logging method (bottom), derived from the same analogue input.

It provides an excellent illustration of how less data points can be used to construct an identical trace.

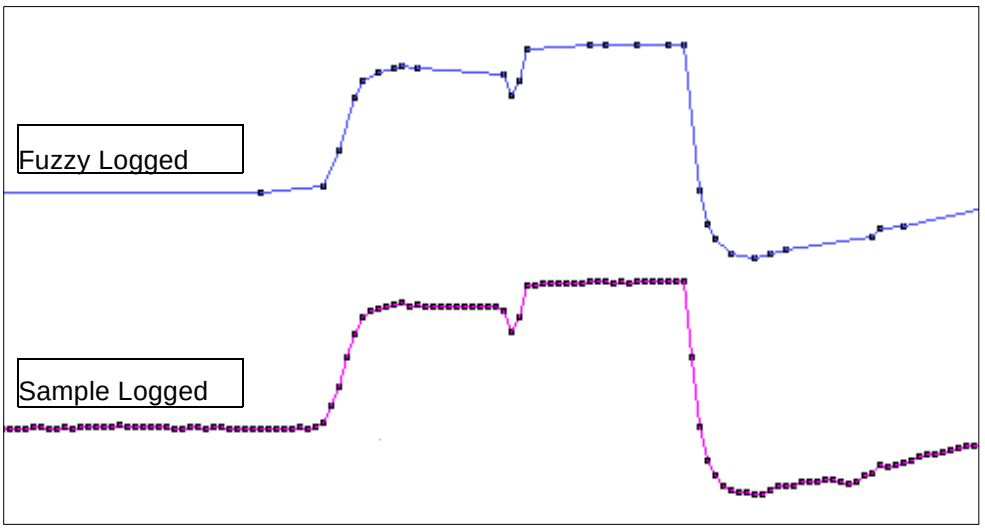


Diagram 2.

NB. This data extract was taken from a 56 hour temperature run, which resulted in approximately 1 Mbyte of sample data, and approximately 40 Kbyte of Fuzzy Logged data.

A compression ratio of 25 times!

Anything else it can do?

Yes! Fuzzy Logging can be used as a **'One Hit'** recording button.

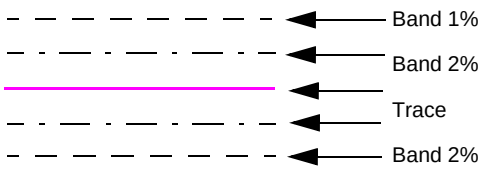
In applications where the measured process is new or the ideal scan rate is unknown Fuzzy Logging is ideal, as it adapts the log rate to the input signal, and can therefore find the optimum logging rate for you.

Tolerance band widths

Tolerance band width can be set as a percentage of the scale range allowed above and below the input signal.

A second band width can be set, this is where a tighter tolerance can be specified which must be set within the limits of Band 1. Specify, as a percentage of the scale range, the tolerance band allowed above and below the input signal.

Figure 14.1 Fuzzy logging tolerance settings



Appendix D - Events

Cause and Effect

The following is a list of all conditions and operations that are logged as Events. It provides a description of the Event followed by a description of the Cause and the Effect tables.

For **X Series and GR** recorders *Table 16 on page 285* and *Table 17 on page 285.*

Not available on the ***100mm key recorder.

Table 14: Cause (***100 & 180mm***recorders only)

Method	Description
Into Alarm	When alarm state is entered
Out Alarm	When alarm state is exited
Counter*	When a counter reaches a specified value
Logging*	When logging starts, stops
Change Set up*	When a set up is changed
Disk/Card % Full	When a disk or PC card is X% full. (X = user defined entry)
Disk/Card Out*	When a disk or PC card is removed from system
Totaliser Start	When totaliser is started
Totaliser Stop	When totaliser is stopped or paused
Totaliser Reset	When a totaliser is reset
Digital Inputs (high)	A digital input has been applied
Digital Inputs (low)	A digital input has been removed
Relay Outputs (high)*	A relay output has been closed
Relay Outputs (low)*	A relay output has been opened
Thermocouple O/C*	Check if thermocouple has reported as open circuit
Screen Change*	When a swap to another screen is generated
Manual Mark On Chart*	When a manual mark on chart is received
Scheduled*	Triggers an event at a specific time
Start-up*	Trigger at recorder start up
Data Flushed*	Logging/Event data has been successfully flushed to disk
ASCII serial data*	When serial data is received through RS232 or RS485
Web Activate	Triggered manually from web page

Not available on the ***100mm key recorder.

Table 15: Effect (*100 & 180mm* recorders only)

Method	Description
Mark On Chart	Cause a mark on chart
Logging	Control logging starts/stops or start logging and discard current data in memory
Start Totaliser	Start totaliser
Stop Totaliser	Stop totaliser
Reset Totaliser	Reset totaliser back to min value or 0
Screen Change*	Automatically swap to another screen
Set Relay	Close relay output(s)
Clear Relay	Open relay output(s)
Counter Control*	Add to or Reset a counter
Event	Trigger another event(s)
Chart Control*	Chart control method: Pause, Resume or Toggle
E-mail	E-mail a message to a user
Flush Data*	Flush all logging data to Disk or PC card
Reset Max/Mins*	Resets visible max/mins

Cause and Effect - X and GR Series

Table 16: Cause - X and GR Series Recorders

Method	Description
Into Alarm	*When alarm state is entered*
Out of Alarm	*When alarm state is exited*
Acknowledge Alarm	*Acknowledge an active alarm, latched or normal*
Totaliser Start	*When totaliser is started*
Totaliser Stop	*When totaliser is stopped or paused*
Totaliser Reset	*When a totaliser is reset*
Totaliser Rollover	*When a totaliser rollover occurs*
Digital Inputs On	*A digital input has been applied*
Digital Inputs Off	*A digital input has been removed*
Digital Input State Change	*When a digital input has changed state On or Off*
TC Burn Out	*When a Thermocouple is in burn out state*
Scheduled	*Setup a Schedule on a timed Interval, on Specific days or at the Month End, or just Once*
User Counters	*User Counter #*
Max Mins (Reset)	*Reset max Min values*
System)	*Power On, Setup Change, Int. Mem. Low, Exp. Mem. Low, FTP Mem. Low*
User Action	*Mark Chart, Hot Buttons (x4)*
Batch	*Start, Stop an Pause chart controls*
TUS	*Start, Stop a Temperature Uniformity Survey*
AMS2750 Timer	*Set TC Timers or Alert Timers as a warning or when expired*

When selecting Totalisers and Alarms etc. ensure they are enabled and configured in the Pens tab.

Table 17: Effect - X and GR Series Recorders

Method	Description
Mark On Chart	*Cause a mark on chart*
Logging Start	*Control logging starts*
Logging Stop	*Control logging stops*
Start Totaliser	*Start totaliser*
Stop Totaliser	*Stop totaliser*
Reset Totaliser	*Reset totaliser back to min value or 0*

Table 17: Effect - X and GR Series Recorders

Method	Description
Reset and Start Totaliser	*Reset totaliser back to min value or 0 and Starts the Totaliser*
Digital Outputs	*Activate a Digital Output On or Off*
Alarm Acknowledge	*Acknowledges an Alarm, single or pen group*
Email	*Sends an Email to recipients*
Screen Change	*Change the recorders screen or turn backlight On/Off. Available in the recorder only*
Print Screen	*Prints current process screen*
Counters	*Count an event occurance. Incl: User, Pulse, Events, Digital Inputs, Pulse Outputs, Alarms*
Max Mins (Reset)	*Reset all Max Min values. Multiple, All or Pen groups.*
Chart Control	*Pause, Stop, Resume, Clear or Prefill chart*
Clear All Messages	*Clear all messages from the message list*
Delayed Event	*Delay an event by a specific amount of time*
Script Timers	*20 independent timers can be controlled. Stop, Start, Reset or Reset and Start.*
Play Sound	*Start or Stop a sound used to alert the user that an event effect has occurred*
Display Alert	*used to display a preset or user defined marker.*
Batch	*used to Start, Stop or Pause a batch*
Reports	*generates a report*
Update Tabular Readings	*updates the tabular screen with latest readings*

Appendix E - Ethernet & E-mail

Ethernet

Ethernet is a local area network (LAN) technology that transmits information between computers and other devices, at speeds of 10 to 100 million bits per second (Mbps). Each Ethernet equipped device operates independently of all other devices on the network.
All devices attached to an Ethernet are connected to a shared signalling system. Ethernet signals are transmitted serially, one bit at a time, over the shared signal channel attached to each device.

It is up to the high-level protocol that is sending data over the network to make sure that the data is correctly received at the destination device.

Devices attached to an Ethernet can send application data to one another using high-level protocol software, such as TCP/IP protocol suite.

High-level protocols have their own system addresses, such as the 32-bit addresses used in the current version of IP. The high-level IP-based networking software in a device is aware of its own 32-bit IP address and can read the 48-bit Ethernet address of its own network interface, but it doesn't know the Ethernet addresses of the other devices on the network.

To discover the Ethernet addresses of other IP-based devices on the network another high-level protocol is used. For TCP/IP, this is done using a protocol called Address Resolution Protocol (ARP).

Example:

Device X has an IP address of 195.23.37.1 and sends data over the Ethernet channel to another IP-based device, Device Y with IP address 195.23.37.2. Device X sends the packets of information containing an ARP request. The ARP request is asking the device with the IP address of 195.23.37.2 to identify the address of the Ethernet Interface.

Only Device Y with the IP address of 195.23.37.2 will respond, sending a packet with the Ethernet address of device Y back to device X. Now device X and Y have each others Ethernet addresses to which data can be sent.

E-mail

General operation of the e-mail system

The recorder sends messages for distribution by an e-mail server. The e-mail server is located by its IP address as set-up in the communications set-up options. When the recorder sends an e-mail message, it locates the e-mail server and uses SMTP (Simple Message Transfer Protocol) to send the message to the e-mail server. SMTP allows the recorder to send messages to an e-mail server without having its own e-mail address; because of this the e-mail server will not be able to send any reply back to the recorder.

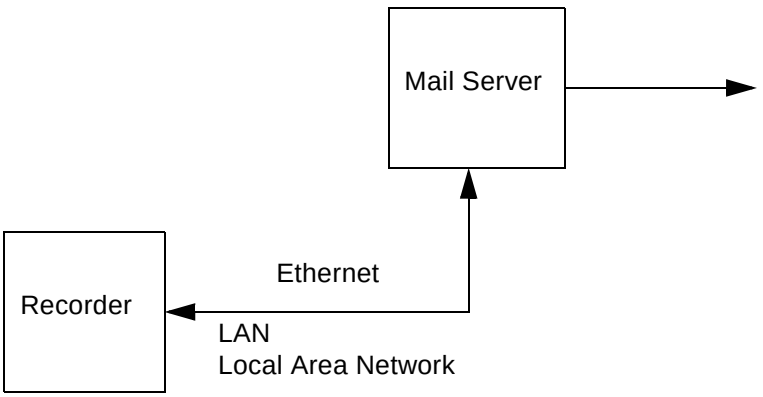
When setting-up the e-mail address list, it is important to include the e-mail administrator address. The Administrator e-mail address is the e-mail address to where the e-mail server will respond in the event of any problems with the delivery of e-mail messages. The Administrator will also appear to be the source of any e-mail messages sent by the recorder. Most e-mail systems require a 'Reply To' address as part of an e-mail message, since the recorder does not have its own e-mail address; it uses the e-mail administrator as the 'Reply To' address.

Any e-mail message will consist of a delivery list (recipients), a subject, and an optional message body. The message body may be omitted for very short messages, or where the message is to be sent to a paging system.

The e-mail subject may be either one of the existing event markers, or one of the two e-mail subjects. The e-mail message body may be either one of the existing event markers, or one of the two e-mail message blocks. Event markers are restricted to 80 characters each. The two e-mail message blocks are restricted to just over 1000 characters each. Both the message subject and body may contain embedded marker tags as used in the event markers.

When the recorder sends an e-mail message that includes a message body, the recorder name, recorder number and the time/date will be appended to the end of the message body text. This is to allow easy identification of when the message was send, and by which recorder.

Any e-mail message is sent as an action within the recorder events system, so anything that can be configured to act as an event cause, may be configured to send an e-mail message. Any e-mail message may be sent to up-to 8 of the recipients. If the e-mail server supports named groups of e-mail addresses, an e-mail message may be sent to a combination of e-mail addresses and e-mail group.



Appendix F: Function Codes and Memory Maps

X & GR Series Modbus Memory Map Supplement:

.

Start Address (Hex)	End Address (Hex)	Description	
1800	185F	Analogue Input Value (48 inputs max.)	
1880	18BF	Communications Inputs (32 comms values max.)*	
2400	24BF	Extended Comms Inputs (96 comms values max.)*	
18C0	197F	Pen Values (96 pens max.)	
1B00	1B7F	Totalisers (64 totalisers max.)	

* Communications Inputs can be set by using Modbus function code 16

NOTE: Some Modbus masters may require an offset of 1 for example instead of entering 1800 enter 1801.

Totalisers

Totaliser values in engineering units, 4 byte IEEE floats using 2 Modbus registers per reading.

Input Text message

This facility allows a text message to be passed to the recorder to be annotated on the chart and added to the message log. The maximum length of the message is 32 bytes of ASCII characters, which need not be null-terminated.

It operates by utilising modbus function code 16 (0x10), Preset Multiple registers, and the unique address 0x0004 in the modbus global register map (Table A-1)

The Start Address will be 00 04, and the Byte Count of the number of bytes in the following text message. As 2 modbus registers are used to pass an address to function 16, the Number of Addresses has to be back calculated from the required Byte Count to give the lowest integer such that (Number of Addresses) * 2 ≥ = Byte Count. For example if Byte Count = 4, then Number of Addresses = 2, but if Byte Count = 5, Number of Addresses = 3.

.As an example, to send the 5-character message Start to a slave address 02 the complete message would be:

Slave Address	Function Code	Start Addr. High	Start Addr. Low	No Addr. High	No Addr. Lo	Byte Count	Data					CRC	CRC
02	10	00	04	00	03	05	53	74	61	72	74	CRC	CRC

The response follows the normal response for function code 16, and so to the above message the response would be: 02 10 00 04 00 03 CRC CRC. .

Analogue Input Value

Analogue readings in engineering units. 4byte IEEE floats using 2 Modbus registers per reading.

Communications Input

Values can be sent to the recorder for inclusion in the Maths Block, using command 16 up to 32 IEEE floats can be sent to the recorder. Using CV1 to CV32 in the Maths Block, these values can be displayed on the pens.

i.e. **P1 = CV1** will set Pen 1 to the engineering value set address 1880 with the function code 16. Once again these are 4 byte IEEE floats using 2 Modbus registers per reading.

Pen Values

Pen values in engineering units, 4 byte IEEE floats using 2 Modbus registers per reading.

Modbus Function Codes

.

Supplemental to Function code 16 with standard address 0004 can be used to send.

Supplemental to Function code 17, Report Device ID:

- Slave ID for **X Series and GR** recorders is always 05.
- Device description

Item	Size in bytes	Contents
Device Description	16d, 0x10	Recorder type+space+software version The length is extended to exactly 16 bytes by trailing 0x00 characters. Recorder type =is a combination of the OEM series name followed by the OEM device name (truncated to 16 characters) Software version is of the form nn.XX eg.00.FQ

- Number of data block records, byte 23, always equals 05, data blocks are always in order.

  00 = Analogue inputs, 02 = Digital inputs, 03 = Digital outputs, 06 = Pens, 09 = Totalisers

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Appendix G - Modbus Communications and Modbus Profile Tool

Trend Analysis Software and Modbus communications

The **X Series** and **GR** recorders implement the industry standard Modbus protocol to enable the retrieval of Realtime data into the ***Trend Analysis software***.

The Modbus protocol defines a standard for communicating groups of registers (which are 2-byte values) to and from a master and a slave that understand the protocol. Registers can be used as bitmasks for “Discrete Inputs” or “Coils”, as well as 2-byte integer values or 4-byte floating point numbers. In all, a Modbus memory map can support 4 different sets of register types, being “Discrete Inputs”, “Coils”, “Input Registers” and “Holding Registers”.

Trend Analysis software supports command 04 input registers at 3xxxx and 03 command (read holding registers) at 4xxxx addresses in December 2006 release and later.

Trend Analysis software currently supports getting “Input Registers” as floating point values, so it will obtain two 2-byte registers in order to get a 4-byte floating point number. ***Trend Analysis software*** does not support programming (writing) register values in a device.

The default is N-8-1 which means no parity, 8 data bits and 1 stop bit. This is currently the only byte option supported by Comms Server.

In order for ***Trend Analysis software*** to talk to a Modbus enabled device, it needs to know something about the Modbus memory map of that device. Without knowledge of the Modbus memory map of a device, ***Trend Analysis software*** will not know what data it can get from the device and where it can get it from. The proprietary protocol Trendbus used by ***100mm and 180mm*** devices allows a device setup to be transmitted in realtime to ***Trend Analysis software*** thus permitting instant setup of realtime data retrieval. This is not supported by Modbus messaging which means that realtime communications with Modbus will not happen “out-of-the-box”

This is where the concept of a Modbus device profile comes in, which is aimed at making the setup of realtime communications with Modbus devices in ***Trend Analysis software*** as straight-forward as possible. A Modbus device profile (or, Modbus profile for short) encapsulates the key information that ***Trend Analysis software*** needs in order to obtain data from a Modbus enabled device.

Trend Analysis software will generate a Modbus profile automatically whenever data or a setup is imported into a database in **Trend Server** from an **X Series** and **GR** recorder or a ***100mm and 180mm*** recorder (although it will not do so when pen data is imported via FTP). If a more recent setup is imported into a database (either imported directly as a setup or imported as a part of logged data) then the Modbus profile for the associated device is automatically updated without any user-intervention required.

When Comms Server is first started up, and if no data or setups have been imported into a database in **Trend Server**, then no Modbus profiles will be available for selection when adding a device.
Once data has been imported into ***Trend Analysis software***, Modbus profiles will be available for selection in Comms Server for setting up realtime data acquisition. The Mod-

bus profile names are based on the given name of the recorder, it's ID number and the type of the recorder (**SX or QX**).

When a Modbus profile is updated it will not automatically be used by Comms Server if it is currently connected to the device concerned. It is only if that device is disabled then re-enabled in Comms Server, or if the device properties window (also known as edit device dialog) is opened for that device and committed with a press of the OK button, that Comms Server will begin to use the updated Modbus profile.

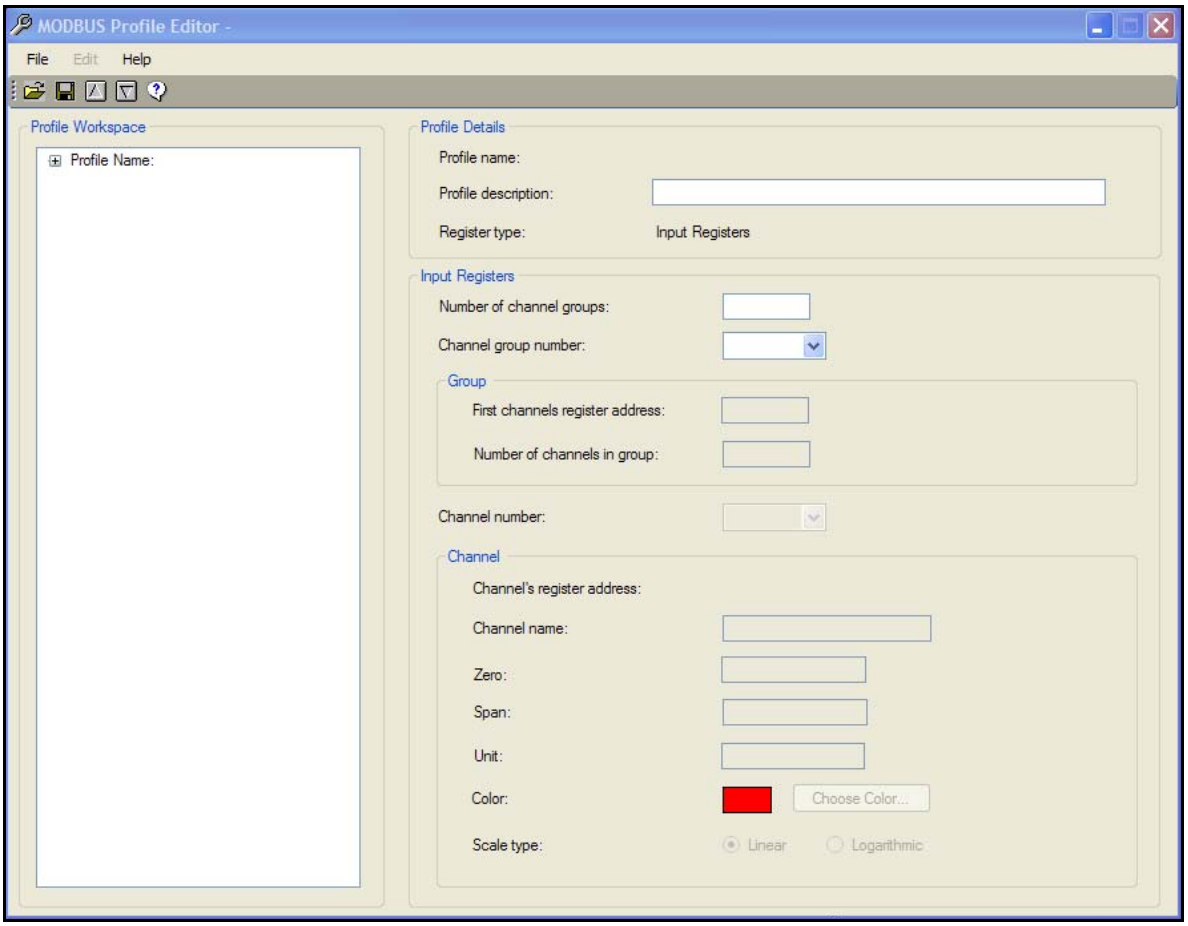
In the case of wanting to connect with Comms Server to a device other than an **X Series** and **GR** recorder or an older ***100mm and 180mm*** recorder, it may be necessary to manually create a Modbus profile, which can be done with the Modbus Profile edit tool.

The Modbus Profile Tool

Installation

The Modbus Profile Tool is available with **Trend Server**. It will install automatically and can be activated from the same location as **Trend Server** software.

The Modbus Profile Tool can be opened by going to **Start > Programs > *Trend Analysis software* Modbus Profile Tool.** The Modbus Profile Editor window will open with empty files ready for a new profile to be created.



Getting started

The Modbus Profile Tool can be used to edit existing Modbus profiles or create new Modbus profiles. It can also be used to export Modbus profiles from one system so that they can be imported into another system. It is generally aimed at enabling the setup of Modbus communications with other devices that support floating point input registers in their Modbus memory map.

The three main courses of action available are:

1. Create a new profile - If there is no recorder setup available in ***Trend Analysis software*** then the Modbus profile will have no content and a new one must be created.
2. Modify an existing profile - If a recorder setup already exists in the ***Trend Analysis software*** it will automatically create a Modbus profile that will be available using this tool. If this is the case go to *"Use an Existing Modbus Profile" on page 299.*
3. Import/export an existing profile that can be transferred between systems. *See "Transferring Modbus profiles between systems" on page 300.*

Create a new Modbus profile

The key information required in order to setup a new Modbus profile is the Modbus memory map of the target device, specifically the floating point input registers that it supports. An example of an existing profile is shown in *Figure 18.1, "Existing Profile," on page 299.*

Modbus Profile Editor window

Enter profile details:

Profile Details

- **Profile name:** This field will be populated when the profile is saved and the profile is named.
- **Profile description:** Enter the description of your device
- **Register type:** Input registers

Input Registers

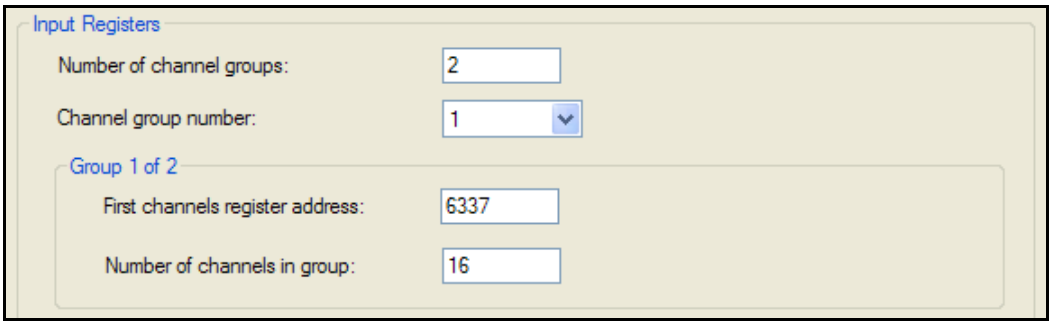
In the Profiler references to channels refers to input registers.

- **Number of channel groups:** Enter the number of groups determined by the division of your input registers. Groups are required for each register or sets of registers that do not occur contiguously in the memory map. For example: Group 1 may consist of Channels 1 to 16 using pens 1 to 16, if there is a gap between the pen numbers a second group is required for channels 1 to 4 using pens 49 to 52.

Be aware that the more groups in the Modbus profile, the less efficient communication will be when connecting to a device. This is because each Modbus profile group requires a separate Modbus message to be made.

When the number of groups has been set the groups can be configured by specifying the number of channels in the group and the register address of the first channel in that group

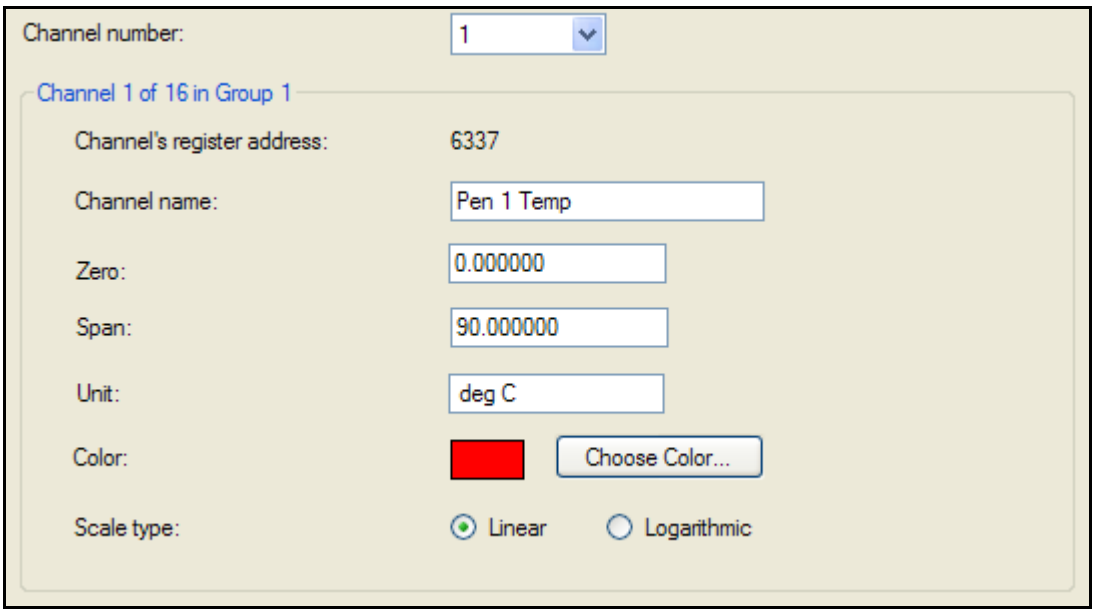
- **Channel group number:** Once the number of groups has been set the groups can be configured by specifying the number of channels in the group and the register address of the first channel in that group. The remaining channel registers addresses in a group are derived from the address of the first channel in the group.
  If you have two groups the drop down menu will give you the option to view details for group 1 or 2.
  Select each group and configure the Modbus profile for all channels in each group



Group 1 of 2 (depending on how many groups you have)

- **First channel register number:** This number can be found in the Modbus Memory Map information found in the instruction manual of your device.
- **Number of channels in group:** Enter the number of channels for the device
- **Channel Number:** Select which channels to view or configure from the drop down menu

Channel 1 of 16 in Group 1 *(depending on what channel number and group has been selected).*
Once a group has been configured with the appropriate number of channels, each channel in that group can be set up. The name, graphing span, unit of measurement and colour of each channel can be configured separately. When values are not specified for the channel, default attributes will be used if not by the Modbus Profile Tool then by **Trend Server** software when the Comms Server reads the Modbus profile.



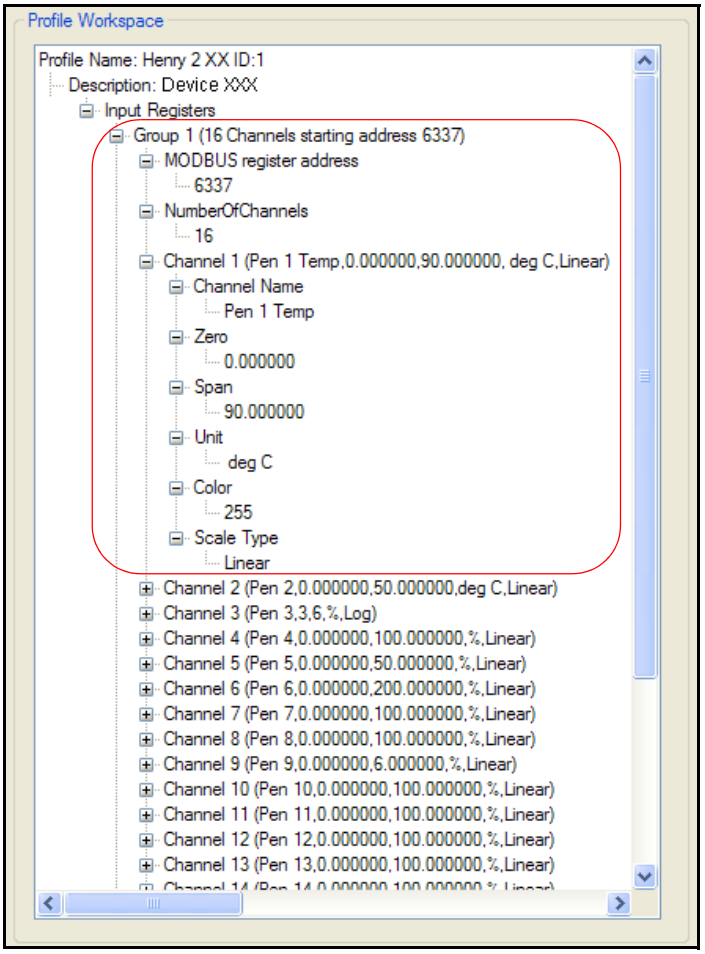
- **Channel's register number:** This is the register address number allocated to this channel.
- **Channel name:** This displays the channel information made up from the register type, group number and the channel number within the group. This can be changed as required.
- **Zero:** Enter the zero or bottom limit of the pen/channel scale
- **Span:** Enter the Span or top limit of the pen/channel scale
- **Unit:** Select the units of measure to be used for the scale
- **Colour:** This will always display the channel colour as red for new profiles. If an existing profile is used then the colours from the recorder's setup will display.
- **Scale type:** Select a Linear or Logarithmic scale

The profile can be saved and will be automatically be available to use with devices in Comms Server. Comms Server has a Test Dialog when setting up devices that communicate over Modbus that can be used to verify the Modbus profile.

Profile Workspace

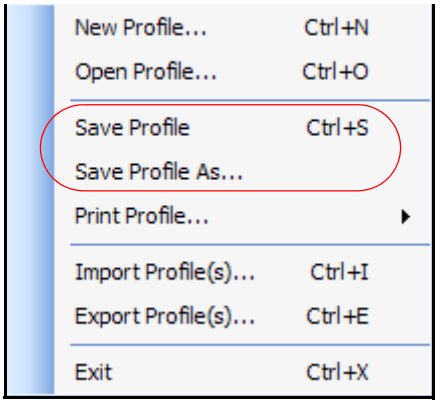
As the Modbus profile is being created the information is being constructed in the Profile Workplace window on the left. The window will display the profile in an hierarchal tree.

Click on the + box to expand the profile and display the Modbus register addresses, Number of channels and channel details for each channel. In the Profiler references to channels refers to input registers.



Saving a Profile

When the new profile is complete use the Save icon or go to File and select Save Profile. It is recommended to name the profile so that it includes the recorder name, the recorder type and the ID. eg **Station 2 XX ID:21**. Identifying the type of recorder will be useful when creating similar Modbus profiles in the future. This profile can be called up modified and saved (Save Profile As) with a new profile name. The new saved profile will appear in the Comms Server list.

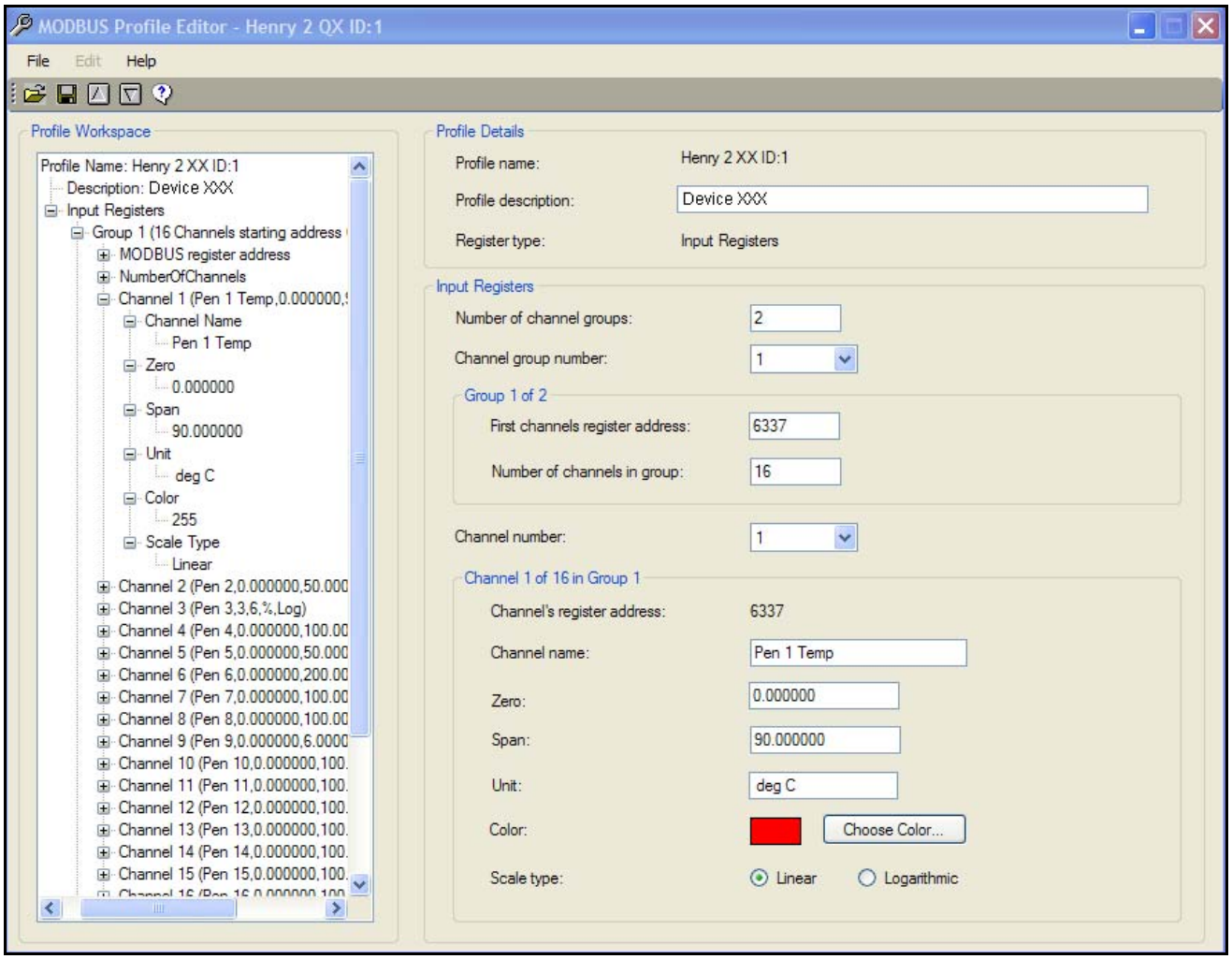


Use an Existing Modbus Profile

To open and use an existing Modbus profile either go to File > Open or select the yellow folder in the toolbar. Select a profile to match your recorder from the list provided.

The attributes that can be modified are described in *"Create a new Modbus profile" on page 295.* When the modified profile is complete it can be overwritten by selecting "Save Profile" or to save as a new profile select "Save Profile As" from the File menu. The new saved profile will appear in the Comms Server list.

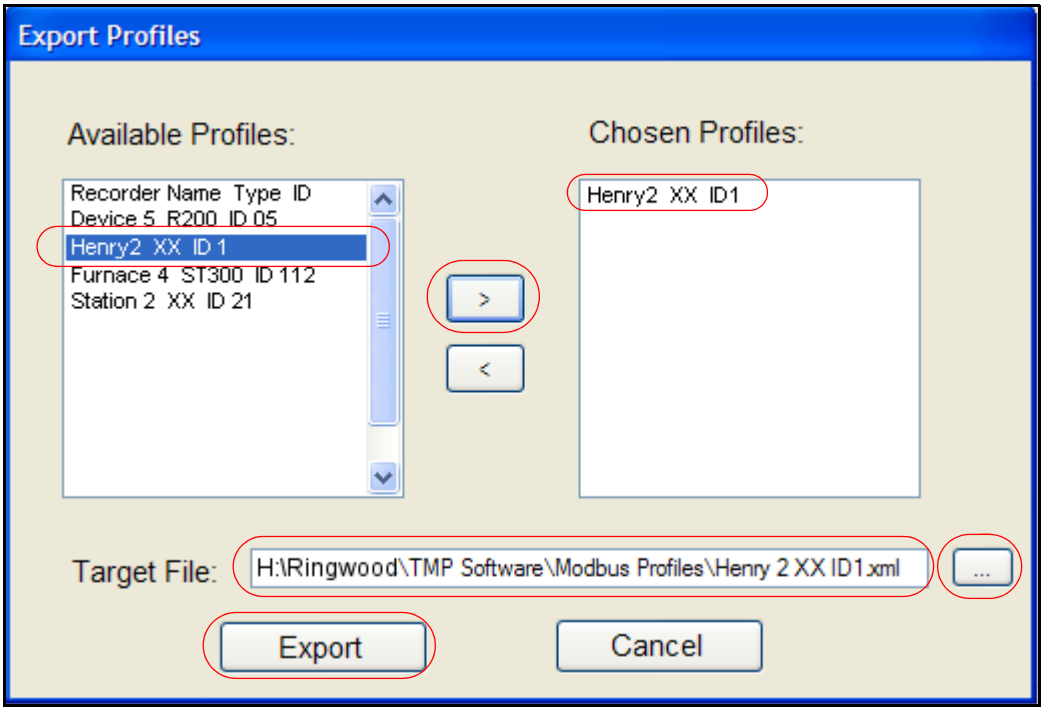
FIGURE 18.1 Existing Profile



Transferring Modbus profiles between systems

Exporting Modbus Profile(s)

Select Export Profiles(s) from the File drop down list to produce the Export Profiles window. Select the profile you wish to export from the Available Profiles list and click on the right pointing arrow in the middle to transfer the profile to the window on the right. Next you must designate the target location of where you want the profile to be exported to. Select the button to the right of the Target File window and browse to desired location. You can enter the same file name as your profile or a new name if you are exporting several profiles. The .xml file extension will be automatically added to the file name by the Modbus Profile Tool. Click on the Save button to and to enter the entire file path into the Target File window. Select the Export button to send the profile(s) to the target file.



Importing Modbus Profile(s)

The chosen profiles can now be imported into another system.

Run the Modbus Profile Tool on the system where the profiles are required. Select File > Import Profile(s) .... > Profile name. A browser dialog will be displayed for selecting the target .xml file to import modbus profiles on

One the target .xml file for import has been specified the Modbus Profile Tool will Import the profiles. If any modbus profiles found in the .xml file have the same name as an existing profile on the system, the user is asked if they wish to overwrite the existing profile or skip. There are Overwrite All and Skip All options.

When the import is complete the Modbus Profile Tool provides a summary list of the profiles that were imported into the system. These profiles will immediately be available for use the Comms Server when adding or editing a device for Realtime comms.

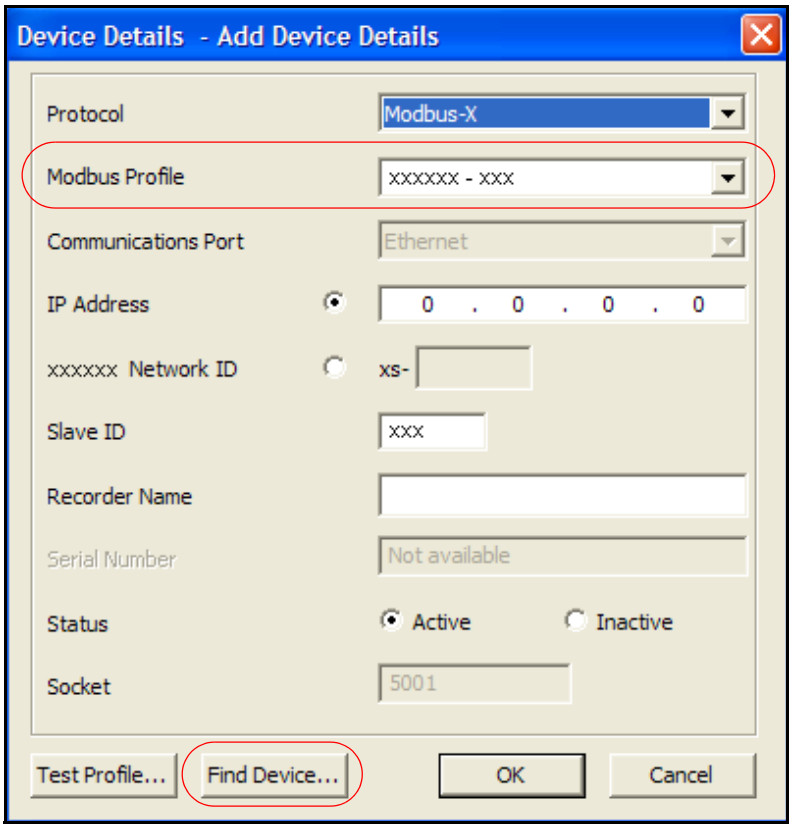
Comms Server and Modbus profile(s)

When Comms Server is first started up, and if no data or setups have been imported into a database in **Trend Server**, then no Modbus profiles will be available for selection when adding a device.The only exception to this is if some standard Modbus profiles for ***Modbus*** devices have been imported into the system.

Once data has been imported into ***Trend Analysis software***, Modbus profiles will be available for selection in Comms Server for setting up realtime data acquisition.

The Modbus profile names are based on the given name of the recorder, it's ID number and the type of the recorder (**SX, QX or QXe**). See *Figure 18.2* .

FIGURE 18.2 Comms Server - Select a profile



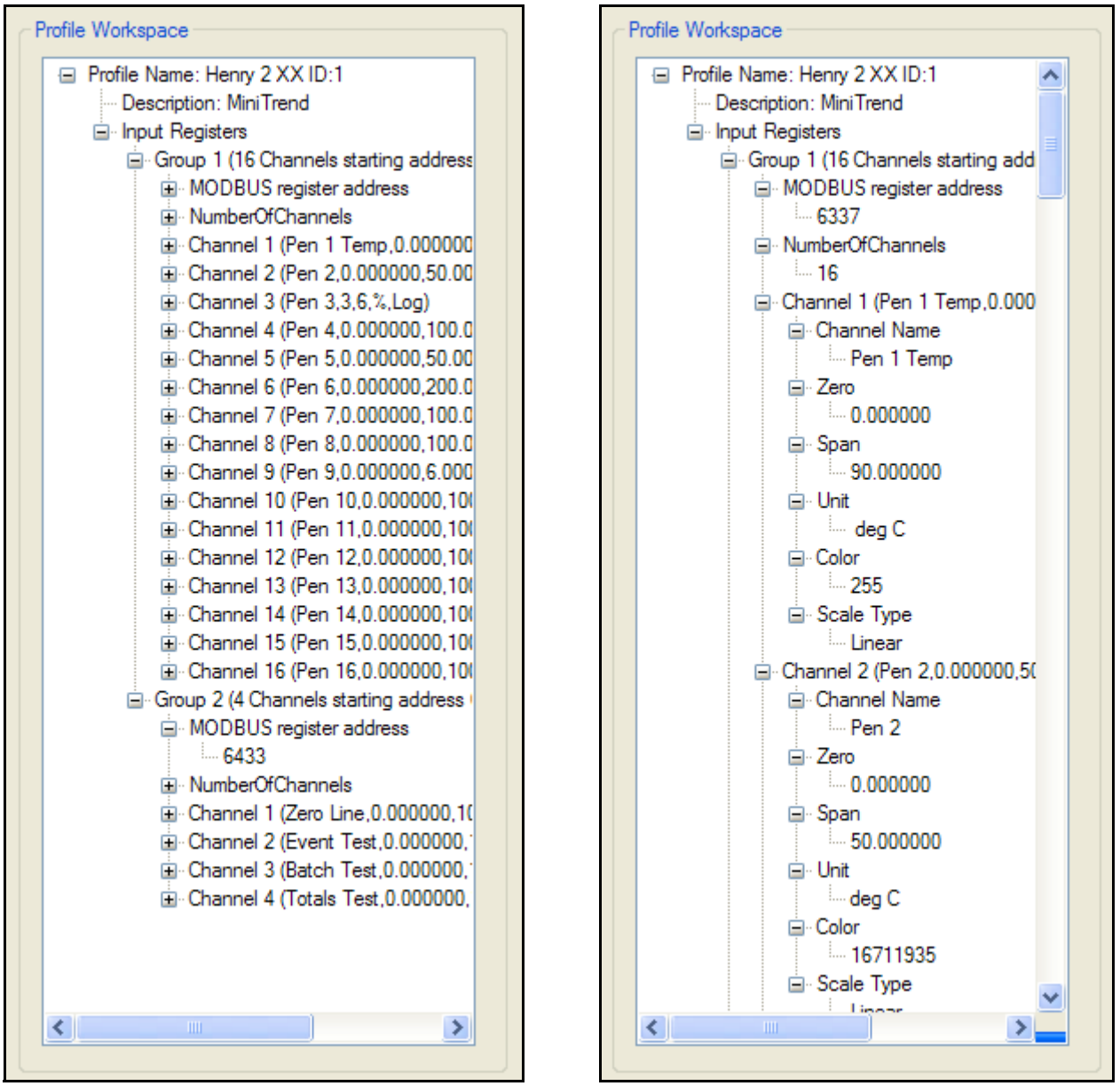
Print Profile

The Print Profile function can be found in the File drop down menu. There are two options:

- **Current View** - This will print exactly what you can see on the Profile Workspace window at the time you select the Current View option.
- **Full View** - This will print the full contents of the Profile window showing each Group, Channel etc. completely expanded through all levels

Figure 18.3 shows the two print options available, Current View on the left and Full View on the right

FIGURE 18.3 Print Profile options - Current and Full View



Modbus profile realtime data update

Trend Server software will generate a modbus profile when data is imported from USB key, SD card or Compact Flash card or when it is manually imported via FTP. This applies to FTP of setup and FTP of pen data. The automatic, or scheduled, FTP import of data from a recorder does not result in an updated modbus profile being generated.

Once a modbus profile has been generated it is immediately available to the Comms Server but will not be automatically used by the Comms Server.

Any new connections created in the Comms Server will use the most recent modbus profile that has been generated when importing data on that PC.

For existing device connections, go to the relevant device and press right mouse button for the context menu. Select Edit Device and then press OK on the resulting dialog. The updated modbus profile will now be in use and this should be evident if you graph the data a couple of minutes later (give enough time for some data to be logged to the database using the updated modbus profile).

So in summary, when updating an **X-Series and GR** recorder configuration, import the setup or pen data that use the new setup into TMS. Do this either via USB/SD card/ Compact Flash or a manual FTP operation, then go to Comms Server and bring up the "Edit Device" dialog (as described above) and press OK.

The Modbus profile names are based on the given name of the recorder, it's ID number and the type of the recorder (**SX, QX or QXe**). See *Figure 18.2* .

Appendix H - IQOQ Protocol Document

IQOQ Protocol Document

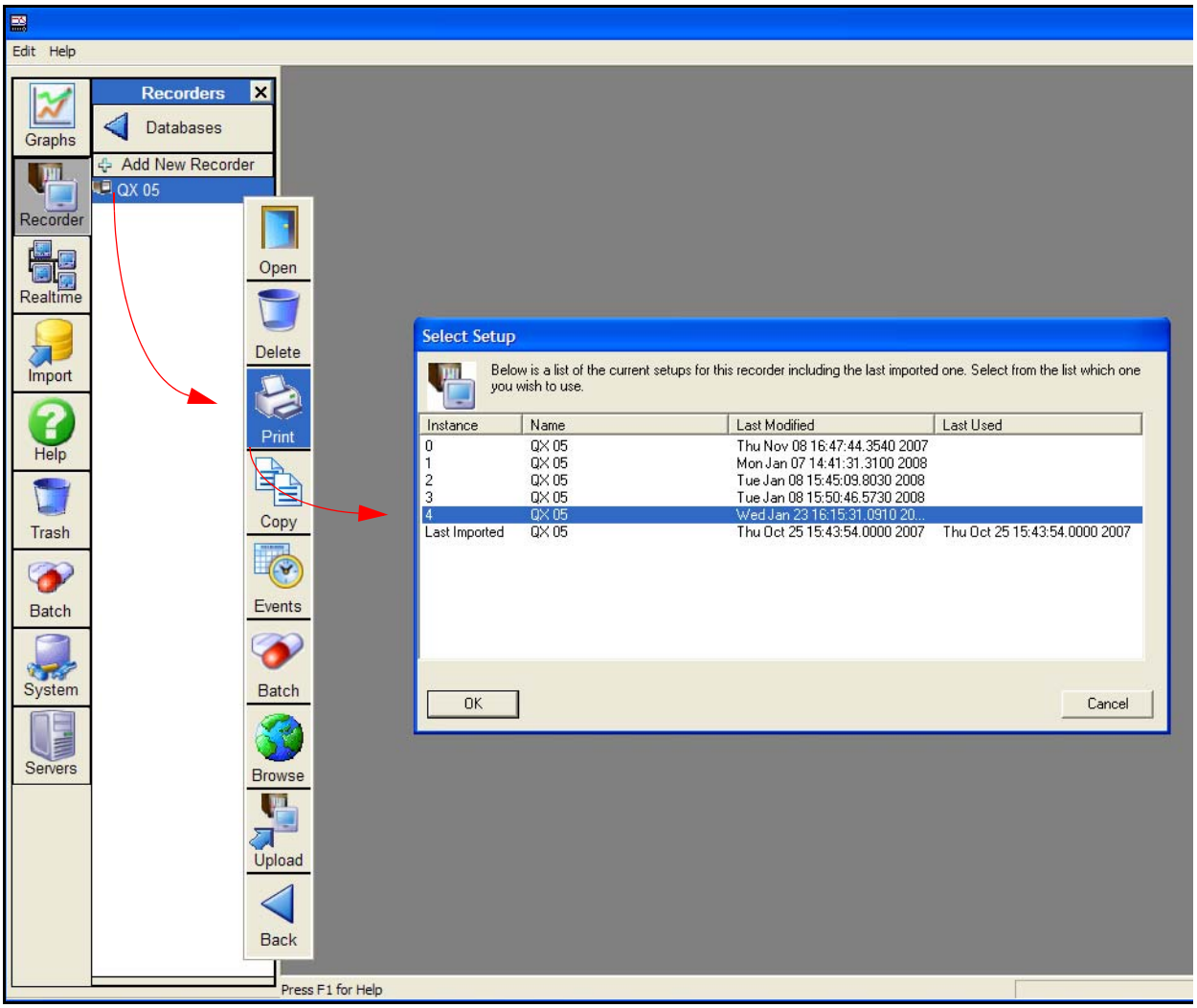
IQOQ stands for Installation Qualification & Operation Qualification. This is a custom built report based on the configuration of a recorder. The configuration can be validated as a process of confirming that a piece of equipment or process meets the stated requirements to produce a regulated product.

The IQOQ protocol product is for the **QXe, QX** and **SX** recorders. The manufacturer is obligated to execute a “Validation Protocol” for every piece of equipment that is associated with a “critical process”. The IQOQ feature aids in doing this and comes with the TrendServer Pro software when ordering the IQ/OQ part number. (50032291-501). When ordering your IQOQ Protocol Tool two codes will be supplied; one for the **Trend Server Pro** software and one to register IQOQ during the setup.

1. The CD based application generates customized IQOQ documentation for the specific recorder model and its associated options. The IQOQ report is documented evidence that the process will produce a consistent product that meets specification. The IQOQ report that is generated is a documentation package that provides verification that all aspects of the recorder installation adhere to**Trend Server Pro** interface select the Recorder icon button from the left side toolbar. This will produce a list of recorders currently residing in a particular database.

Right click your mouse on the recorder you wish to run the IQOQ report on and select the Print button from the pop up toolbar.

FIGURE 19.1 Select recorder and setup to generate an IQOQ report



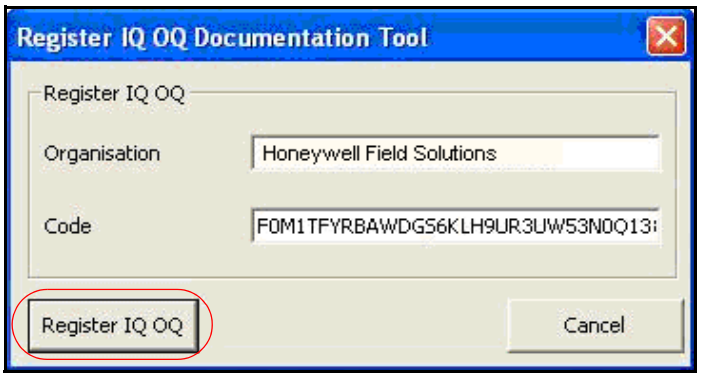
2. Select the desired setup from the Select Setup box. The recorder may have more than one set up saved so be sure to select the correct one.
3. For creating an IQOQ report first you must register your details. Registration is required for each version of **Trend Server Pro** software.

.

4. Click on the Register IQOQ button in the Select Print Option box to open the Register IQOQ Documentation Tool. See *Figure 19.2 .*
   If you simply want to print the setup, without IQOQ, then select Print Setup and the Print Setup box will appear

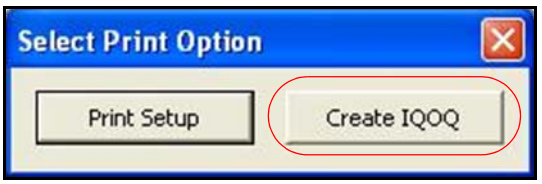
.

FIGURE 19.2 Register IQOQ



5. In the Register IQOQ Documentation Tools enter information to register your IQOQ document. Registration is only required once and this process will not be necessary for creating further IQOQ reports.

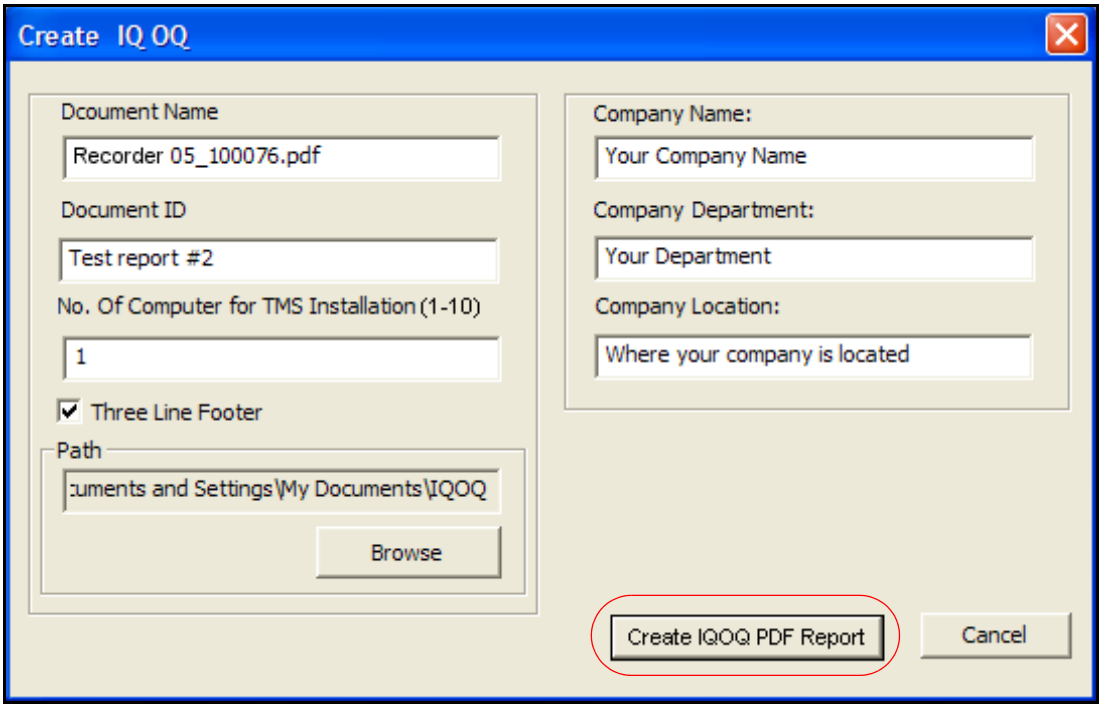
   - In the Organisation box enter the company name as stated on the label.
   - In the Code box enter the code that is supplied with the CD. You will receive two codes one for the **Trend Server Pro** installation and a second code that enables the generation of the IQ/OQ protocol, enter this code here. Then click on the Register IQOQ button.



6. Once registration is successful the Register IQOQ button, in the Select Print Setup box will change to the Create IQOQ button, select this to enter the document details.

7. When the Create IQOQ button is selected the Create IQOQ dialogue will appear. This is where the information about this report is entered.

FIGURE 19.3 Create IQOQ dialogue box



- **Document Name:** Enter the name the PDF document will be saved as. If not changed this will default to the name of the recorder in the recorder list and the serial number.
- **Document ID:** Enter ID information that will appear in the header of the PDF document for your own reference.
- **No of Computers for TMS installation (1-10)**: Number of units where TMS is going to install. This value must be greater than or equal to 1. This value must be an integer value. The report will create a table of inventory of hardware components for each computer where the TMS software is going to be used.
- **Three Line Footer:** Three lines of footer information are set as default. Un-Tick this option if only two line are required. The third line footer gives the option to verify with a signature and date.
- **Path:** This is the file path where the generated PDF document will be located. A folder is automatically created in this location called IQOQ. The default location is My Documents.
- **Company Name:** Enter your company name for which the IQOQ is going to apply.
- **Company Department:** Enter details of the department for which the IQOQ is going to apply.
- **Company Location:** Enter the Company Location where the IQOQ is going to apply

8. When all the information is entered click on “Create IQOQ PDF Report” and the generation of the document will begin. Once the PDF creation starts, a box will appear saying “Generating IQOQ Report” and progress bar will display the status.

9. The progress bar can be closed during the creation if necessary and the report will not be generated. This may be required if details in the Create IQOQ box need to be changed before the report in run.

10. If the PDF name already exists in the location a warning message will appear. If a file of the same name is already open you will be prompted to close the file first, before clicking, to ensure that the file is replaced with the new PDF being generated.

11. When the IQOQ PDF report is complete it will be saved to the file path specified in the Create IQOQ dialogue.

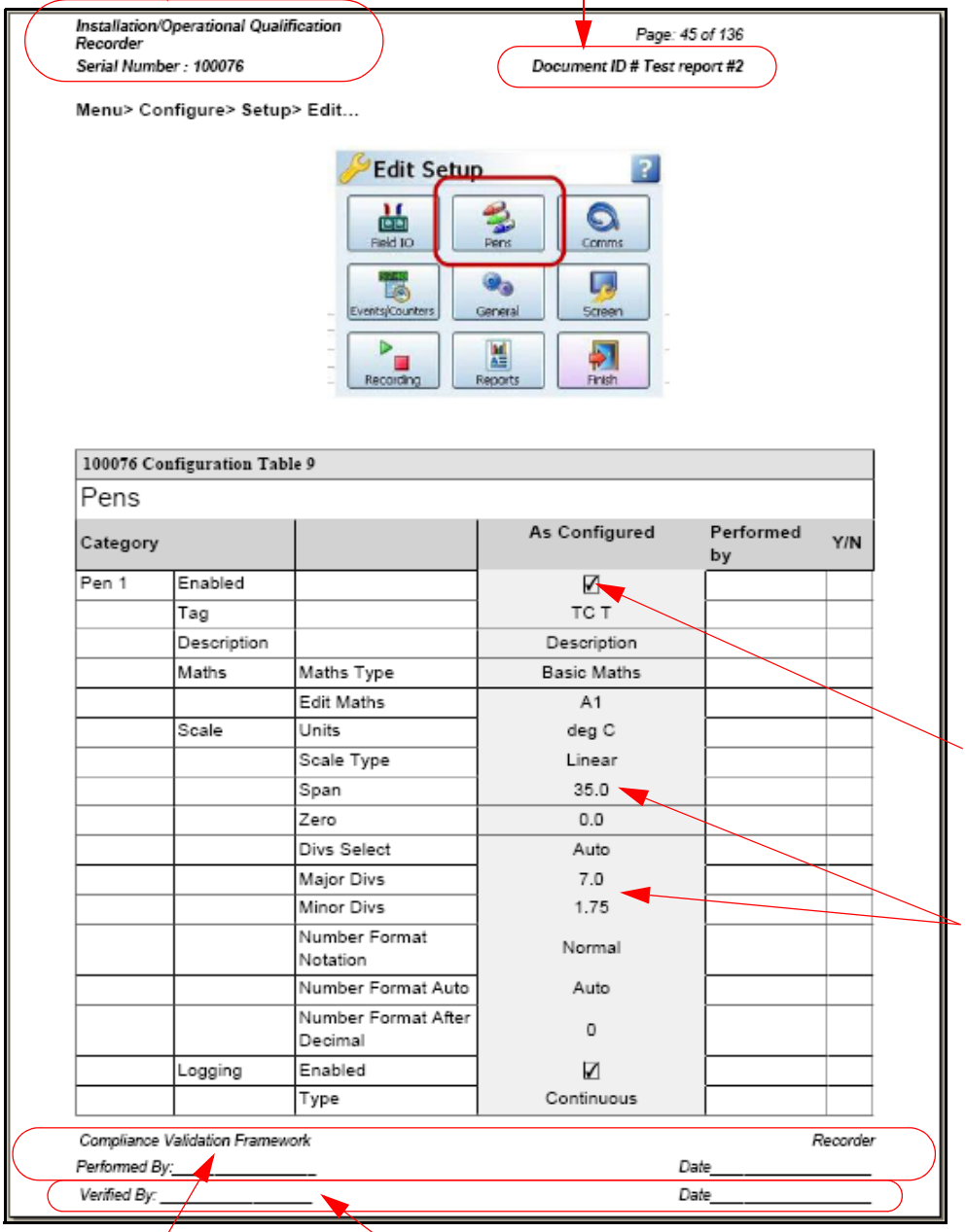
12. On completion of the report creation, a Yes/No box can be selected to launch the IQOQ PDF report immediately.

The process is complete and any open boxes can now be closed..

FIGURE 19.4 Sample page from an IQOQ document

Header information: Document description, recorder information and serial number all appear by default.

Header information: Document ID as entered in Print IQOQ Setup dialog



Installation/Operational Qualification
Recorder
Serial Number : 100076

Page: 45 of 136

Document ID # Test report #2

Menu> Configure> Setup> Edit...

100076 Configuration Table 9

Pens

Category			As Configured	Performed by	Y/N
Pen 1	Enabled		☑		
	Tag		TC T		
	Description		Description		
	Maths	Maths Type	Basic Maths		
		Edit Maths	A1		
	Scale	Units	deg C		
		Scale Type	Linear		
		Span	35.0		
		Zero	0.0		
		Divs Select	Auto		
		Major Divs	7.0		
		Minor Divs	1.75		
		Number Format Notation	Normal		
		Number Format Auto	Auto		
		Number Format After Decimal	0		
	Logging	Enabled	☑		
		Type	Continuous		

Compliance Validation Framework *Recorder*

*Performed By:*_____ *Date*_____

*Verified By:*_____ *Date*_____

The IQOQ document shows how the recorder is currently set up when this report was generated.

Tick marks indicate that the parameter is set or enabled no tick indicates it is not enabled.

Values show the current configuration value.

Footer information: 2 lines by default

Footer information:3rd line for verification is optional in Print IQOQ Setup dialog

Appendix I - Batch Report Tool

Batch Report Tool Overview

Batch report function can be used to generate the report for a specific batch data in PDF (read only) format. It provides a better, intuitive and professional report as compared to reports that get generated at recorder side for specific batch. The report provides all data or specific data with timestamp which was not supported on recorder side reports. Along with data values, it also displays this data in graphical format. It also provides many features like Batch Status, Pen Overview, Min/Max values for batch data, System/Alarm/Security messages, etc.

It also provides space for Auditor or external agency to provide below details like Reviewed By, Checked By, and Comments.

This tool can generate a batch report from **Trend Manager/Trend Server** software in PDF format.
Trend Manager/Trend Server software is required in order to use this Batch tool.

Note: Batch report utility will work only with administrator access users.

Open Batch Report Tool

The Batch Report Tool is launched by opening **Trend Manager/Trend Server** software and selecting the Batch button from the left hand side. This will open the Batch View dialog box containing available batches, see *Figure 20.1 on page 312.*

This tool can generate Batch report from **Trend Manager/Trend Server** in PDF format.

The batch report contains following details:

- Batch Report Name, Description, Lot No., Comment,
- Batch report data within Batch start time and Batch finish time for all Pens available in the batch.
- Min/max information for every pen present in the Batch.
- Events occurred within Batch start and end time (System messages, User Messages, Alarm messages, Security messages etc.).
- Batch Graph.

The Batch report option is available in Batch view dialog as shown below.

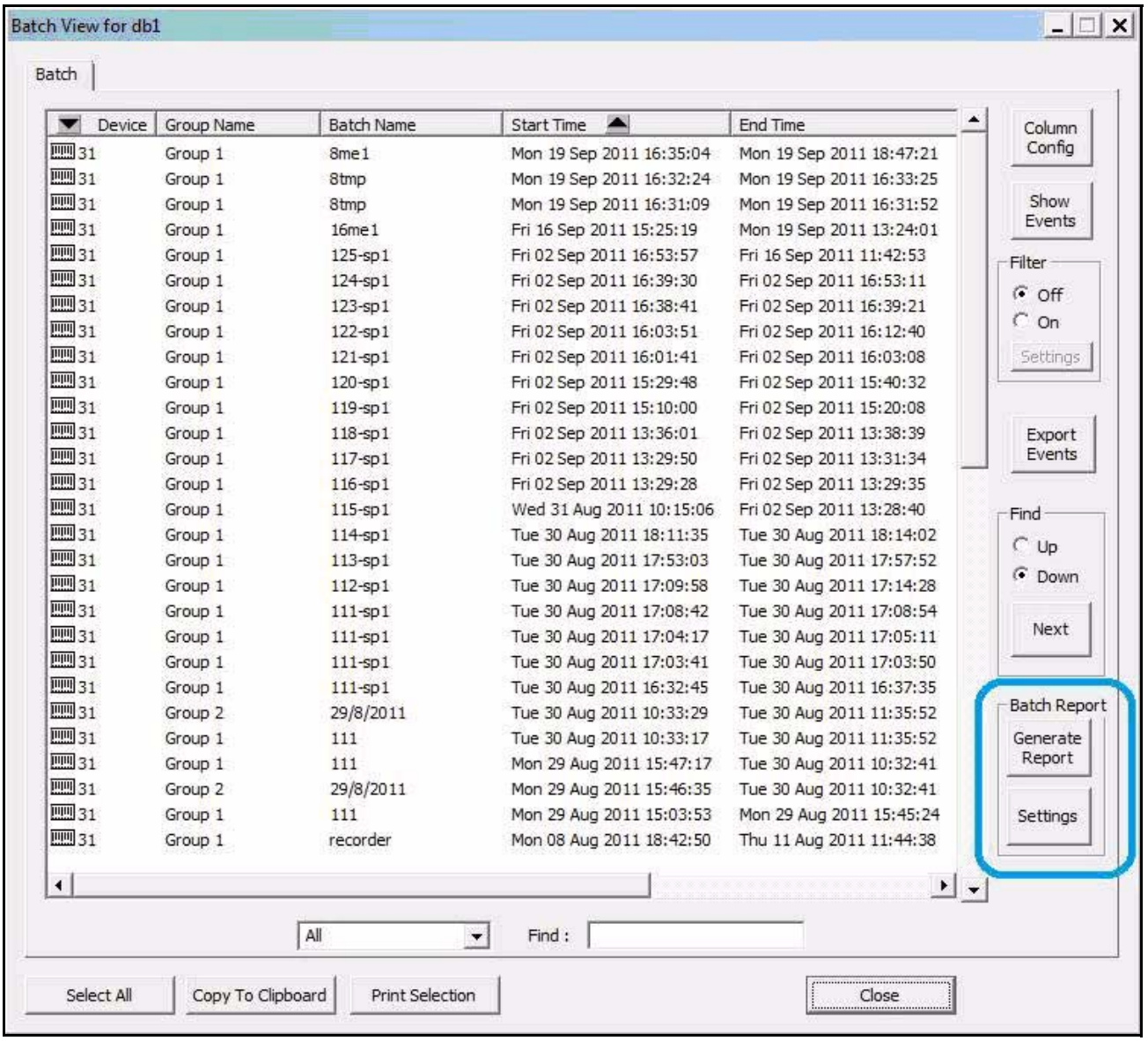


FIGURE 20.1 Batch view

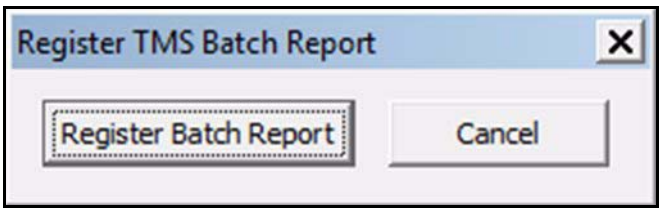
There are two Batch Report options:

1. *"Generate Report" on page 313*
2. *"Settings Button" on page 314*

Generate Report

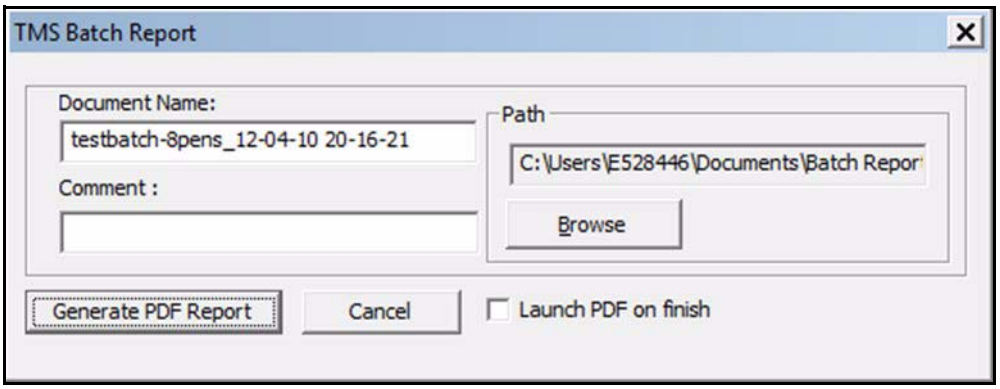
Registration

When user select Generate Report, If user has NOT registered for ***Trend Analysis*** Batch report then Registration dialog will pop up as shown below.



Once Registration is done, below dialog will be popped up.

Register Batch Report



Batch Report details

i. Default report name will be [Batch Name]_[BatchReport_StartTime]

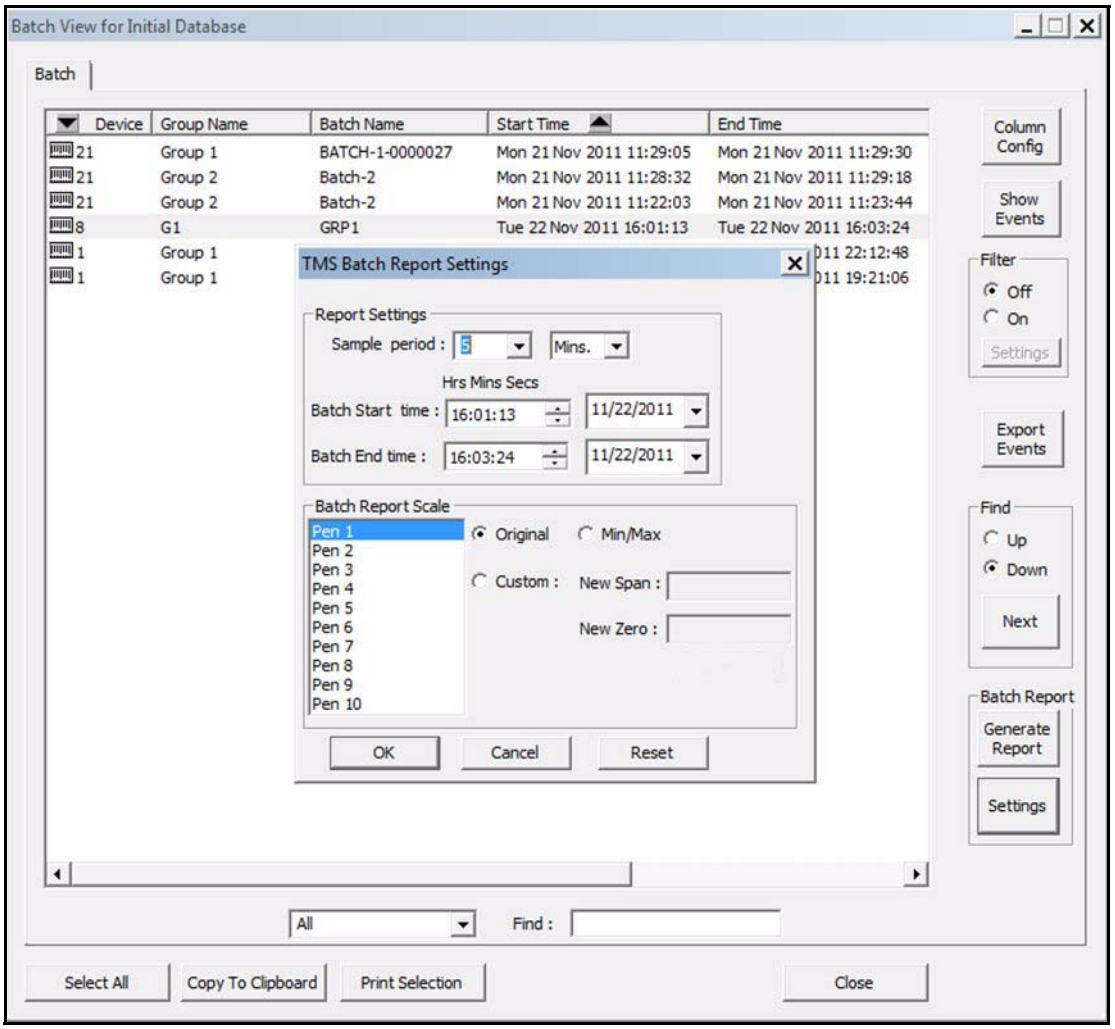
ii. Default path will be [UserDirectory]\Batch Report. This can be changed by selecting Browse.

ii. User can put comments in "Comment" edit box which will be displayed in PDF report as Additional comments.

After putting all above information, a report will be generated with default settings from start time to end time of batch and report time will be for 5 minutes (Currently sample period is default set to 5 Minutes). This is because user has not selected specific time and/or log rate in the settings dialog.

Settings Button

Whenever user click on “Settings” control from batch view, following dialog will be shown.



The batch report setting dialog mainly contains following settings

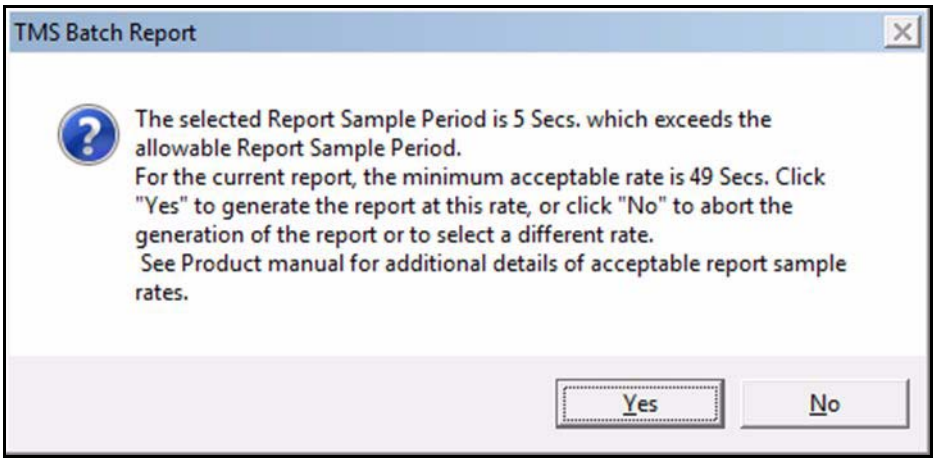
1.Sample period: This is batch report sample period. By default it is set to 5 Minutes.

User can set batch report sample period from 1 sec. to 60 hours.

There is no co-relation between Batch report sample period and individual pen sample period.

If some pens have sample period lesser or more than the batch sample period then data for the respective pen will get padded (* will appended before padded data).

If user has selected faster log rate than the minimum allowed log rate, application will pop up the following message box


TMS Batch Report
The selected Report Sample Period is 5 Secs. which exceeds the allowable Report Sample Period.
For the current report, the minimum acceptable rate is 49 Secs. Click "Yes" to generate the report at this rate, or click "No" to abort the generation of the report or to select a different rate.
See Product manual for additional details of acceptable report sample rates.
Yes
No

Refer to the table below to check minimum allowed sample period for different number of pens.

Note: The maximum number of pens in a batch supported by the Batch Reporting Tool is 32.

	Pen 8	Pen 16	Pen 24	Pen 32
	Report rate - 1 Sec.	Report rate - 1 Sec.	Report rate - 1 Sec.	Report rate - 1 Sec.
Max Duration allowed	2 Hours	60 Mins.	45 Mins.	30 Mins.
Max readings allowed	7200	3600	2700	1800
Pages	191	165	175	150

2.Batch Start time and Batch End time:

Batch start and end time will show the time for which batch has run. Initially application will show actual Batch start and End time.

User can change the start and end time to generate TMS batch report for specific period.

E.g. If user want to generate 2 Hours of report, user can set the start and end batch time accordingly in above batch report settings dialog. Now Batch report will be generated with above settings.

3.Batch Report scale:

Mainly there are three types of scales:

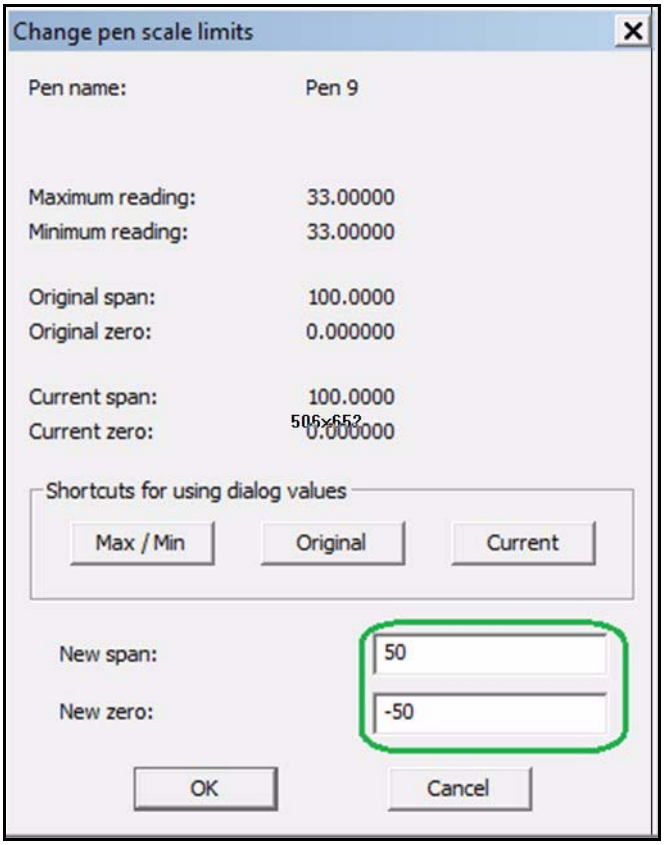
i. Original: with Original scale option, Batch report will show data as per the scale limit of that Pen.

e.g. in a batch there 2 pens, pen 1 scale is 0 to 100 and its value is 59, then this value will be shown as 59 in the batch report as it is within scale limits, and pen 2 scale is 33 to 55 but its value is 200, then based on scale, its value will be somewhere near 55 and this value will be shown on batch report.

ii. Min/Max: with Min/Max scale option, Batch report will show actual data.

e.g. In a batch there 2 pens, pen 1 scale is 0 to 100 and its value is 59, then this value will be shown in batch report as 59 as it is within scale limits, and pen 2 scale is 33 to 55 but its value is 200, but as it has been selected as min/max, its value will be 200 and this value will be shown on batch report.

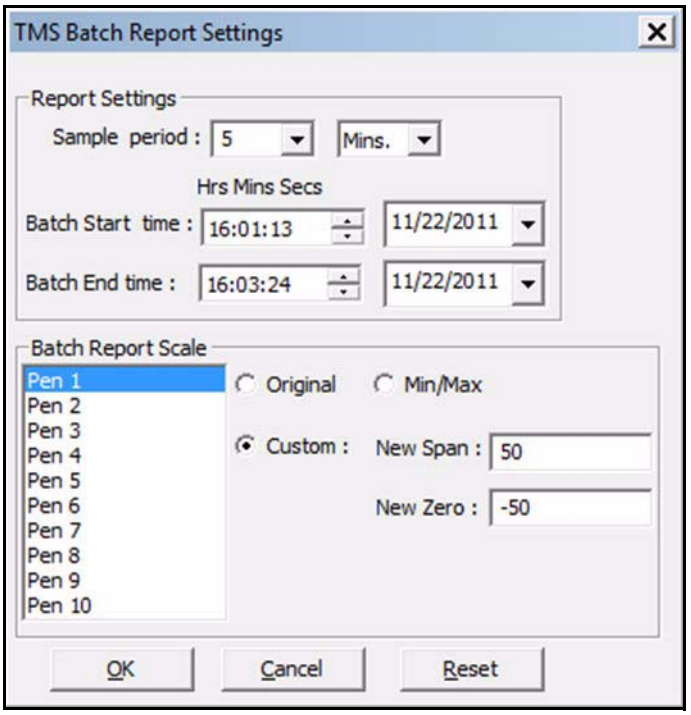
iii. Custom: with Custom scale option, Batch report will show data as per the scale limit of that Pen. User can set the new Zero and new Span for each individual pen as per his requirement.



In batch report, you will need to select the required pen and set the custom scale as shown below.

For each pen, once user has changed any of the above three scales, user needs to click on Apply button.

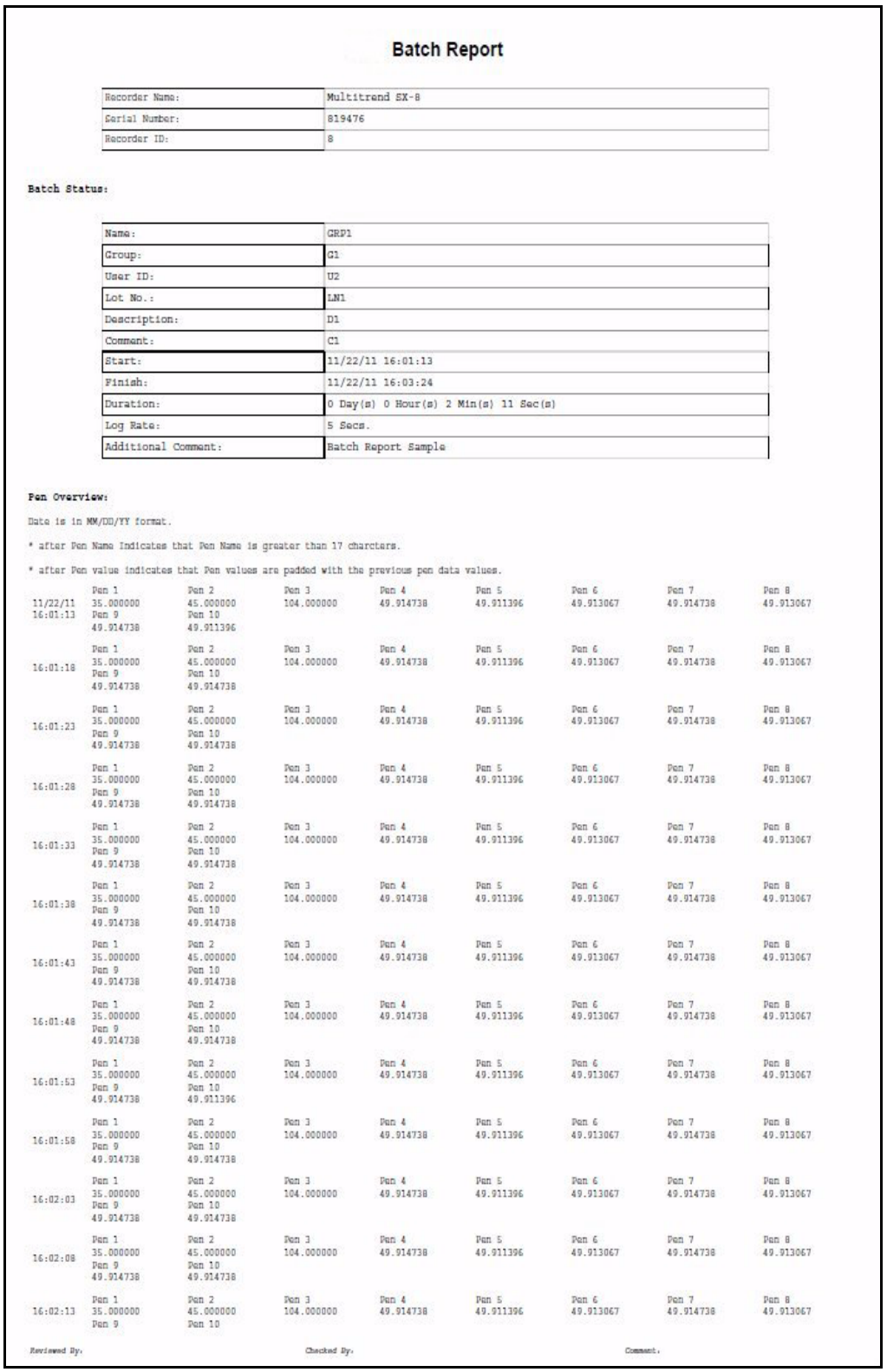
The batch report will open automatically after generation, if requested. The dialog box will automatically close.



Note: The Batch report utility will work only with administrator access users.

Sample Batch Report

Below is a sample batch report.



Batch Report

Recorder Name:	Multitrend SX-8
Serial Number:	819476
Recorder ID:	8

Batch Status:

Name:	GRP1
Group:	G1
User ID:	U2
Lot No.:	LN1
Description:	D1
Comment:	C1
Start:	11/22/11 16:01:13
Finish:	11/22/11 16:03:24
Duration:	0 Day(s) 0 Hour(s) 2 Min(s) 11 Sec(s)
Log Rate:	5 Secs.
Additional Comment:	Batch Report Sample

Pen Overview:

Data is in MM/DD/YY format.

* after Pen Name indicates that Pen Name is greater than 17 charcters.

* after Pen value indicates that Pen values are padded with the previous pen data values.

	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
11/22/11 16:01:13	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.911396						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:18	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:23	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:28	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:33	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:38	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:43	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:48	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:53	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.911396						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:01:58	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:02:03	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:02:08	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						
	49.914738	49.914738						
	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Pen 8
16:02:13	35.000000	45.000000	104.000000	49.914738	49.911396	49.913067	49.914738	49.913067
	Pen 9	Pen 10						

Reviewed By. *Checked By.* *Comment.*

	49.914738	49.914738						
16:02:18	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:23	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:28	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:33	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:38	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:43	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.911396	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:48	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:53	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:02:58	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:03:03	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:03:08	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:03:13	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:03:18	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.911396	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067
16:03:23	Pen 1 35.000000 Pen 9 49.914738	Pen 2 45.000000 Pen 10 49.914738	Pen 3 104.000000	Pen 4 49.914738	Pen 5 49.911396	Pen 6 49.913067	Pen 7 49.914738	Pen 8 49.913067

System Max/Mins Information

Pen	Max	Min
Pen 1	35.000000 wTuesday, November 22, 2011 4:01:13 PM:190	35.000000 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 2	45.000000 wTuesday, November 22, 2011 4:01:13 PM:190	45.000000 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 3	104.000000 wTuesday, November 22, 2011 4:01:13 PM:190	104.000000 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 4	49.914738 wTuesday, November 22, 2011 4:01:13 PM:190	49.914738 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 5	49.911396 wTuesday, November 22, 2011 4:01:13 PM:190	49.911396 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 6	49.913067 wTuesday, November 22, 2011 4:01:13 PM:190	49.913067 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 7	49.914738 wTuesday, November 22, 2011 4:01:13 PM:190	49.914738 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 8	49.913067 wTuesday, November 22, 2011 4:01:13 PM:190	49.913067 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 9	49.914738 wTuesday, November 22, 2011 4:01:13 PM:190	49.914738 wTuesday, November 22, 2011 4:01:13 PM:190
Pen 10	49.914738 wTuesday, November 22, 2011 4:01:18 PM:190	49.911396 wTuesday, November 22, 2011 4:01:13 PM:190

No Alarm Messages available

No System Messages available

No Security Messages available

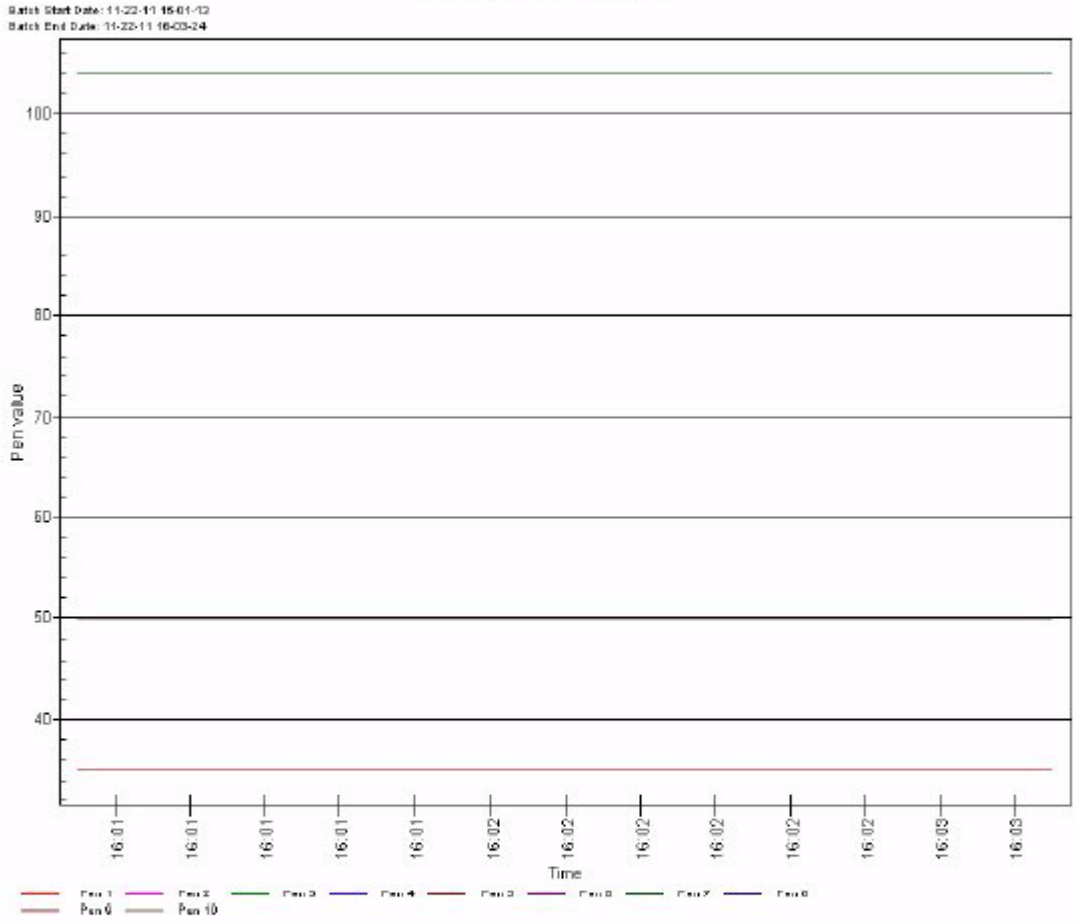
User Messages From Tuesday, November 22, 2011 4:01:13 PM:000Tuesday, November 22, 2011 4:03:24 PM:000

Time	Date	Message
16:01:13	22/11/11	Start : GRP1

Reviewed By: *Checked By:* *Comment:*

Time	Date	Message
16:01:13	22/11/11	Start Logging on Pen Group: G1
16:01:13	22/11/11	User ID : U2
16:01:13	22/11/11	Lot Number : LN1
16:01:13	22/11/11	Description : D1
16:01:13	22/11/11	Comment : C1
16:03:24	22/11/11	End : GRP1 Stopped

Sample Batch data Graph



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